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Northrop Grumman Systems Corporation

QUARTERLY OPERATION, MAINTENANCE, AND MONITORING REPORT FOR THE BETHPAGE PARK GROUNDWATER CONTAINMENT SYSTEM

Third Quarter 2015

Operable Unit 3 (Former Grumman Settling Ponds)
Bethpage, New York (NYSDEC ID #1-30-003A)

November 30, 2015

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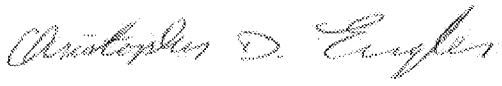

Christopher Engler, PE 069748

Principal Engineer/Engineer of Record

Quarterly Operation, Maintenance, and Monitoring Report for the Bethpage Park Groundwater Containment System

Third Quarter 2015

Operable Unit 3 (Former Grumman Settling Ponds)

Bethpage, New York

NYSDEC ID #1-30-003A

Prepared for:

Northrop Grumman Systems Corporation

Prepared by:

Arcadis of New York, Inc.

Two Huntington Quadrangle

Suite 1S10

Melville

New York 11747

Tel 631 249 7600

Fax 631 249 7610

Our Ref.:

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Date:

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ACRONYMS AND ABBREVIATIONS

AGC	Annual Guideline Concentration
AOC	Administrative Order on Consent
BPGWCS	Bethpage Park Groundwater Containment System
DAR-1	Division of Air Resources Air Guide-1
DCE	dichloroethene
gpm	gallons per minute
µg/L	micrograms per liter
MASC	maximum allowable stack concentration
NYSDEC	New York State Department of Environmental Conservation
O&M	Operation and Maintenance
OM&M	Operation, Maintenance, and Monitoring
RAO	remedial action objective
RI	Remedial Investigation
SCG	standards, criteria, and guidance values
SPDES	State Pollutant Discharge Elimination System
TCE	trichloroethene
USEPA	United States Environmental Protection Agency
VC	vinyl chloride
VOC	volatile organic compound

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1 INTRODUCTION

Pursuant to the Administrative Order on Consent (AOC) Index #W1-0018-04-01 (New York State Department of Environmental Conservation [NYSDEC] 2005) and the Operable Unit 3 (OU3) Record of Decision (NYSDEC 2013), ARCADIS of New York, Inc. (Arcadis), on behalf of Northrop Grumman Systems Corporation (Northrop Grumman), has prepared this OU3 Bethpage Park Groundwater Containment System (BPGWCS) Quarterly Operation, Maintenance, and Monitoring Report (OM&M Report) for submittal to the NYSDEC. The present-day Bethpage Community Park property (Park), the McKay Field, and Plant 24 Access Roads, which the NYSDEC has termed the "Former Grumman Settling Ponds Area" and designated as OU3, are referred to herein as the Site Area. Figure 1 provides a Site Area location map.

The BPGWCS (previously referred to as the Groundwater Interim Remedial Measure) has been operational since July 21, 2009. The operation, maintenance, and monitoring (OM&M) activities performed during the third quarter of 2015 (i.e., July 1 through September 30, 2015 [the "reporting period"]) are summarized in this OM&M Report. During this reporting period, Remedial System and Environmental Effectiveness Monitoring Programs were conducted in accordance with the NYSDEC-approved OU3 Groundwater Interim Operation, Maintenance, and Monitoring Manual (OM&M Manual; Arcadis 2009).

As discussed in the OU3 Site Area Remedial Investigation Report (Site Area RI; Arcadis 2011), Northrop Grumman does not take responsibility for certain compounds (e.g., Freon 12 and Freon 22) present in Site Area groundwater. Throughout this OM&M Report, a distinction is made between "Project" and "Non-Project" volatile organic compounds (VOCs), defined as follows:

- Project VOCs: VOCs that may be related to former Northrop Grumman historical activities. For this OM&M Report, Project VOCs include 1,1,1-trichloroethane; 1,1-dichloroethane; 1,2-dichloroethane; 1,1-dichloroethene; tetrachloroethene; trichloroethene (TCE); vinyl chloride (VC); cis-1,2-dichloroethene (cis-1,2-DCE); trans-1,2-dichloroethene; benzene; toluene; and total xylenes.
- Non-Project VOCs: VOCs, such as Freon 12 and Freon 22, that are understood to be unrelated to former Northrop Grumman activities but have been detected in Site Area groundwater. As noted in the Site Area RI (Arcadis 2011), a sub-plume of Freon 22 has been identified originating from the area of the Town of Oyster Bay's (Town's) former ice rink (shown on Figure 2). Based on Town information (Zervos 2007), Freon 22 was used by the Town and released to the environment.

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2 BETHPAGE PARK GROUNDWATER CONTAINMENT SYSTEM OBJECTIVES

Remedial action objectives (RAOs) for the BPGWCS are as follows:

- Mitigate the off-site migration of dissolved-phase VOCs. Specifically, the BPGWCS addresses:
  - Groundwater with total VOC concentrations higher than 5 micrograms per liter (µg/L) in the upper 20 feet of the surficial aquifer across the 1,200-foot-wide lateral extent of the Site Area southern boundary
  - Groundwater below the upper 20 feet of the surficial aquifer with total VOC concentrations higher than 50 µg/L across the 1,200-foot-wide lateral extent of the Site Area southern boundary.
- Comply with applicable NYSDEC standards, criteria, and guidance values (SCGs) for treated water and air emissions.

A secondary benefit of the BPGWCS is the creation of a clean-water front atop downgradient groundwater, which minimizes the potential for vapor intrusion downgradient of the Site Area.

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3 BETHPAGE PARK GROUNDWATER CONTAINMENT SYSTEM DESCRIPTION

The BPGWCS consists of:

- A pump-and-treat system where groundwater is:
  - Extracted along the Plant 24 Access Road via four remedial wells
  - Conveyed to a treatment plant at McKay Field via four underground pipelines
  - Treated via air stripping to reduce concentrations of Project and Non-Project VOCs
  - Filtered to remove oxidized metals to comply with applicable NYSDEC SCGs for treated water
  - Returned to the aquifer via a discharge pipeline routed to a recharge basin located on the adjacent former Bethpage Navy Weapons Industrial Reserve Plant property
- A vapor-phase treatment system that reduces concentrations of Project VOCs in the air stripper off-gas prior to discharge to the atmosphere
- A groundwater monitoring network that is periodically monitored to assess environmental effectiveness of the BPGWCS.

Major components of the BPGWCS are as follows:

- Four remedial wells (RW-1, RW-2, RW-3, and RW-4) with design pumping rates of 30 gallons per minute (gpm), 75 gpm, 75 gpm, and 30 gpm, respectively; for a total design influent flow rate of 210 gpm
- One low-profile air stripper to remove VOCs from extracted groundwater prior to discharge to the recharge basins
- Two bag filter units configured so that one is operational and the other is in standby mode. The system control logic automatically switches from the operational filter unit to the standby filter unit when the bag filter is full to prevent a system shutdown, and the spent filters are then replaced.
- Four emission control units, two containing vapor-phase granular-activated carbon and two containing potassium permanganate-impregnated zeolite, to treat Project VOCs in the air stripper off-gas
- The groundwater monitoring network, consisting of 35 monitoring locations, including 17 groundwater monitoring wells, four remedial wells, and 14 piezometers.

The OM&M Manual (Arcadis 2009) provides additional information on the BPGWCS. Figure 2 shows the layout of the BPGWCS, and Figure 3 provides a schematic drawing. Figure 4 shows groundwater sampling locations that form the groundwater monitoring network. Appendix A provides construction details for the monitoring wells and piezometers.

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4 OPERATION AND MAINTENANCE ACTIVITIES

The following BPGWCS operation and maintenance (O&M) activities, conducted during this reporting period, are summarized in Table 1.

- The system was monitored either through site visits or remotely by wireless computer link-up.
- The Supervisory Control and Data Acquisition System operated as designed, and when conditions warranted (see below), the system shut down automatically and instantaneously, and notified plant operators of system advisories and alarms.
- Intentional system shutdowns were as follows (see Table 1 for more information):
  - Installation of a new pump and motor in RW-3 and new shroud in RW-2 (July 16, 2015)
  - Qualitative pressure test of the influent pipelines for RW-1 and RW-2 (August 12, 2015)
- System shutdowns due to alarm conditions were as follows (see Table 1 for more information):
  - Low flow alarm at Remedial Well RW-3 (July 3, 2015): the problem was caused by decreasing performance of the pump and motor. The solution was to adjust the settings and restart the system.
  - Low pressure alarm at Remedial Well RW-3 (July 5, 2015): the problem was caused by an overloaded motor. The pump and motor were replaced July 16, 2015.
  - Bag filter differential high pressure alarm (July 20, 2015): the problem was caused by multiple bag filter changes in a short period of time. The solution was to replace the bag filters and restart the system.
  - Low flow alarm at Remedial Well RW-2 (September 14, 2015): the problem was caused by an overloaded motor. The pump and motor were replaced September 16, 2015.
  - Low manifold pressure alarm (September 17, 2015): the problem was caused by decreasing well performance. The solution was to adjust the applicable water control valves and restart the system.

4.1 Summary of Operation and Maintenance Conclusions

The BPGWCS operated continuously, at either full or reduced flow, during this reporting period, with the exception of shutdown periods for routine maintenance and alarm conditions.

- The BPGWCS operated at full or reduced capacity 89 out of 92 days (97 percent uptime).
- Based on groundwater volume recorded at the remedial well flow meters, remedial wells operated at average flow rates of 29 gpm (RW-1), 71 gpm (RW-2), 65 gpm (RW-3), and 29 gpm (RW-4). The observed average flow rates for all remedial wells were lower than their design flow rates (RW-1 and RW-4 averaged 97 percent of design, RW-2 averaged 95 percent of design, and RW-3 averaged 87 percent of design) due to approximately 13 days of downtime attributed to a motor overload condition at RW-3, approximately 2.5 days of downtime attributed to a motor overload condition at RW-2, 2 days of downtime attributed to scheduled maintenance, and alarm-related treatment system downtime. Remedial wells operated at reduced instantaneous flow rates (between 93 percent and 97

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percent of design) during portions of the reporting period due to iron build-up in the pumps, influent pipelines, and valves. The reduced flow rates were corrected by adjusting the manifold globe valves and performing remedial well maintenance.

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5 SYSTEM MONITORING ACTIVITIES

The following compliance and performance monitoring activities were conducted during this reporting period (see Appendix B, Table B-1 for a summary of the compliance and performance monitoring program requirements).

- Three sampling events to collect required water samples and air samples
- Nine weekly site visits to monitor and record key system operational parameters

System O&M results are summarized in the following tables, graphs, and appendices:

- Operational Summary, including monitoring events, system operational days, and noteworthy site activities (Table 1)
- Summary of Influent and Effluent Water Sample Analytical Results (Tables 2 and 3, respectively) - Table 3 also provides the BPGWCS treatment system removal efficiency. Appendix B includes complete validated water sample analytical results summaries for each sampling event.
- Summary of Influent and Effluent Vapor Sample Analytical Results (Tables 4 and 5, respectively) - Table 5 also provides the BPGWCS treatment system removal efficiency. Appendix C includes complete, validated vapor sample analytical results for each sampling event.
- System Parameters, including flow rates, line pressures, and temperatures (Table 6)
- Summary of Groundwater Recovered, VOC Mass Recovered, and VOC Mass Recovery Rates (Table 7) - Table 7 provides a breakdown of these parameters by Remedial Well and System and breaks down the VOC mass recovered and VOC recovery rates into Project, Non-Project, and total VOCs.
- Air Discharge Quality Evaluation and Summary of Air Emissions Model Output (Appendix D and Table 8, respectively)
- Concentrations of VOCs and Metals in Remedial Well Groundwater Samples (Tables 9 and 10, respectively)
- Cumulative Total, Project, and Non-Project VOC Mass Removed (Figure 5)
- Remedial Well Total, Project, and Non-Project VOC Concentrations (Figures 6A, 6B, and 6C, respectively)
- Influent Total, Project, and Non-Project VOC Concentrations (Figure 7)
- Total, Project, and Non-Project VOC Mass Recovery Rates (Figures 8A, 8B, and 8C, respectively).

5.1 Summary of Operation, Maintenance, and Monitoring Results and Conclusions

5.1.1 System Operation and Effectiveness

BPGWCS OM&M reporting period results and conclusions are summarized below.

- Total volume of groundwater recovered and treated (Table 7):

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  - Third quarter 2015: 26.3 million gallons
  - Cumulative total since system startup: 634 million gallons
- Total VOC mass recovered (Table 7 and Figure 5):
  - Third quarter 2015: 10 pounds (lbs) of VOCs
  - Cumulative total since system startup: 2,096 lbs of VOCs
- VOC mass recovered and mass removal rates (Table 7 and Figures 8A, 8B, and 8C):
  - Majority of VOCs recovered during this reporting period were Project VOCs (76 percent or 7.6 lbs)
  - Majority of Project VOCs are recovered by RW-2 (96 percent)
  - Majority of Non-Project VOCs are recovered by RW-3 (50 percent) and RW-4 (38 percent)
- Treatment system influent concentrations (Table 2 and Figures 6A, 6B, 6C, and 7):
  - The Project VOC influent concentration, which was 25 µg/L during the reporting period, is consistent with historical values. This concentration is well below the recent peak concentration observed in 2014 (105 µg/L). Project VOC influent concentrations have generally decreased since 2010.
  - The Non-Project VOC influent concentration, which was 6.2 µg/L during the reporting period, is consistent with historical values. This concentration is below the recent peak concentration observed in 2014 (55 µg/L). Non-Project VOC influent concentrations have generally decreased since 2010.
  - Total iron in the influent sample was detected at 981 µg/L, which is consistent with historical values. Total iron in the effluent samples ranged from 259 to 325 µg/L, which is below the total iron discharge limit of 600 µg/L.
  - Mercury has not been detected in any influent or effluent sample since system startup.
- Project VOCs in Remedial Wells RW-1, RW-3, and RW-4 (Table 9) were not detected during this reporting period at concentrations higher than applicable SCGs, while in Remedial Well RW-2, several Project VOCs (cis-1,2-DCE, toluene, TCE, and VC) continue to be detected at concentrations higher than applicable SCGs. Similar to total influent concentrations, Project VOC remedial well concentrations have generally decreased since 2010.
- Non-Project VOCs in Remedial Wells RW-1, RW-2, and RW-4 (Table 9) were not detected at concentrations higher than applicable SCGs during this reporting period. In Remedial Well RW-3, one Non-Project VOC (chloroform) was detected at concentrations higher than applicable SCGs. Similar to total influent concentrations, Non-Project VOC remedial well concentrations have generally decreased since 2010.
- The air stripper, air stripper off-gas treatment system, and bag filter system performed within acceptable operating ranges for this reporting period, as indicated by:

- The air stripper VOC removal efficiency was greater than 99.9 percent for Project and Non-Project VOCs (Table 3).
- Both water and air discharges complied with applicable SCGs and discharge limits (Tables 3, 5, and 8).

5.1.2 Regulatory Status of Discharges

Air Discharge

To determine the compliance status of air discharge from the BPGWCS treatment system, the system's effluent vapor concentrations were compared to NYSDEC Division of Air Resources Air Guide-1 (DAR-1) Model Short-term Guideline Concentrations (SGCs [NYSDEC 2014]; Table 5) and the effluent vapor laboratory results were compared to a site-specific modelled annual maximum allowable stack concentration (MASC). The annual MASC was calculated during each monitoring event for individual compounds using the output from the United States Environmental Protection Agency (USEPA) SCREEN3 Model in conjunction with the NYSDEC DAR-1 Annual Guideline Concentrations (AGCs). A scaling factor was calculated using the SCREEN3 model with site-specific physical layout information (e.g., building dimensions, stack height, terrain) and operating data (e.g., air flow rate, temperature) inputs for each monitoring event. The scaling factor was then used to adjust (scale) the NYSDEC DAR-1 AGC to a site-specific MASC. Table 8 provides a summary of the instantaneous percent (i.e., not time-weighted) of the site-specific annual MASC for detected Project and Non-Project VOCs, as well as a summary of the cumulative annual percent (i.e., time-weighted) of the site-specific MASC. Appendix D provides a summary of the model inputs, outputs, and backup calculations.

The BPGWCS air effluent met NYSDEC requirements throughout the reporting period, as indicated by the following:

- The measured concentrations of individual VOCs in the vapor effluent did not exceed applicable SGCs (Table 5).
- The measured concentration of individual VOCs in the vapor effluent did not exceed applicable instantaneous MASCs, as calculated using the USEPA SCREEN 3 Model (Table 8). Similarly, the time-weighted rolling averages for the individual detected Project and Non-Project VOCs are lower than their respective MASCs.

Water Discharge

The BPGWCS-treated water effluent met NYSDEC regulatory requirements during the reporting period (Table 3 and Appendix B), as indicated by the following.

- The measured concentrations of individual VOCs in the treated water effluent were lower than applicable discharge limits, per the interim State Pollutant Discharge Elimination System (SPDES) equivalency permit.
- The measured concentrations of total iron and total mercury in the treated water effluent were lower than applicable discharge limits. In addition, total mercury continues to be non-detect and has not been detected in any treated water effluent sample since system startup.

6 ENVIRONMENTAL EFFECTIVENESS MONITORING

BPGWCS environmental effectiveness (i.e., hydraulic monitoring and groundwater quality monitoring) activities and results for this reporting period are discussed below.

6.1 Hydraulic Monitoring Activities

In accordance with OM&M Manual requirements and methodologies (Arcadis 2009), a quarterly round of groundwater hydraulic monitoring was performed during the reporting period. Specifically, depth-to-water measurements were completed on August 20, 2015 at the 31 locations forming the approved monitoring well network (Table 11). The groundwater monitoring network site plan is provided on Figure 4.

6.2 Groundwater Quality Monitoring Activities

Consistent with the OM&M Manual (Arcadis 2009), groundwater quality monitoring was not required during this reporting period.

6.3 Environmental Effectiveness Monitoring Conclusions

The findings and conclusions of the Draft BPGWCS Hydraulic Effectiveness Study are forthcoming and will be used to update and/or modify future quarterly report environmental effectiveness conclusions, as necessary.

7 RECOMMENDATIONS

- Remove mercury from the SPDES equivalency monitoring program because mercury has not been detected in any system effluent water sample analyzed for mercury since beginning operation of the BPGWCS in July 2009.
- Modify the routine system monitoring to reduce the frequency of site visits from weekly to monthly, as discussed with the NYSDEC. Upon receipt of NYSDEC approval of this recommendation, the OM&M Manual (Arcadis 2009) will be updated to reflect this change.
- Based on the consistent operation of the BPGWCS since July 2009, the current quarterly reporting frequency should be reduced to annual. Consistent with the NYSDEC-approved OM&M Manual (Arcadis 2009), an annual report will be prepared to summarize system operation, performance, and monitoring data; this annual report will be prepared and submitted under the supervision of a licensed, professional engineer. Additionally, pertinent data collected for the BPGWCS will be submitted to the NYSDEC quarterly. Upon receipt of NYSDEC approval of this recommendation, the OM&M Manual (Arcadis 2009) will be updated to reflect this change.

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8 REFERENCES

ARCADIS of New York, Inc. (Arcadis). 2009. Interim Operation, Maintenance, and Monitoring Manual, Northrop Grumman Groundwater Interim Remedial Measure, Operable Unit 3 (Former Grumman Settling Ponds), Bethpage, New York. December 2009.

Arcadis. 2011. Remedial Investigation Report (Site Area). Operable Unit 3 – Former Grumman Settling Ponds, Bethpage, New York. NYSDEC Site #1-30-003A. February 8, 2011.

Arcadis. 2012. Operation, Maintenance, and Monitoring Report for the Groundwater Interim Remedial Measure, 2011 Annual Summary Report. Operable Unit 3 – Former Grumman Settling Ponds, Bethpage, New York. NYSDEC Site #1-30-003A. March 23, 2012.

New York State Department of Environmental Conservation (NYSDEC). 2005. Order on Consent, Index #W1-0018-04-01, Site #1-30-003A, July 4, 2005.

NYSDEC. 2009. Interim State Pollution Discharge Elimination System (SPDES) Letter, March 19, 2009.

NYSDEC. 2013. Record of Decision, Northrop Grumman – Bethpage Facility, Operable Unit Number: 03, State Superfund Project, Bethpage, Nassau County, Site No. 130003A, March 29, 2013.

NYSDEC. 2014. DAR-1 AGC/SGC Tables, Revised February 28, 2014.

Zervos, Theodore. 2007. Deposition of Theodore Zervos in the matter Town of Oyster Bay v. Northrop Grumman Systems Corporation et al. Case No. 05-CV-1945 (TCP)(AKT). January 22, 2007.

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TABLES

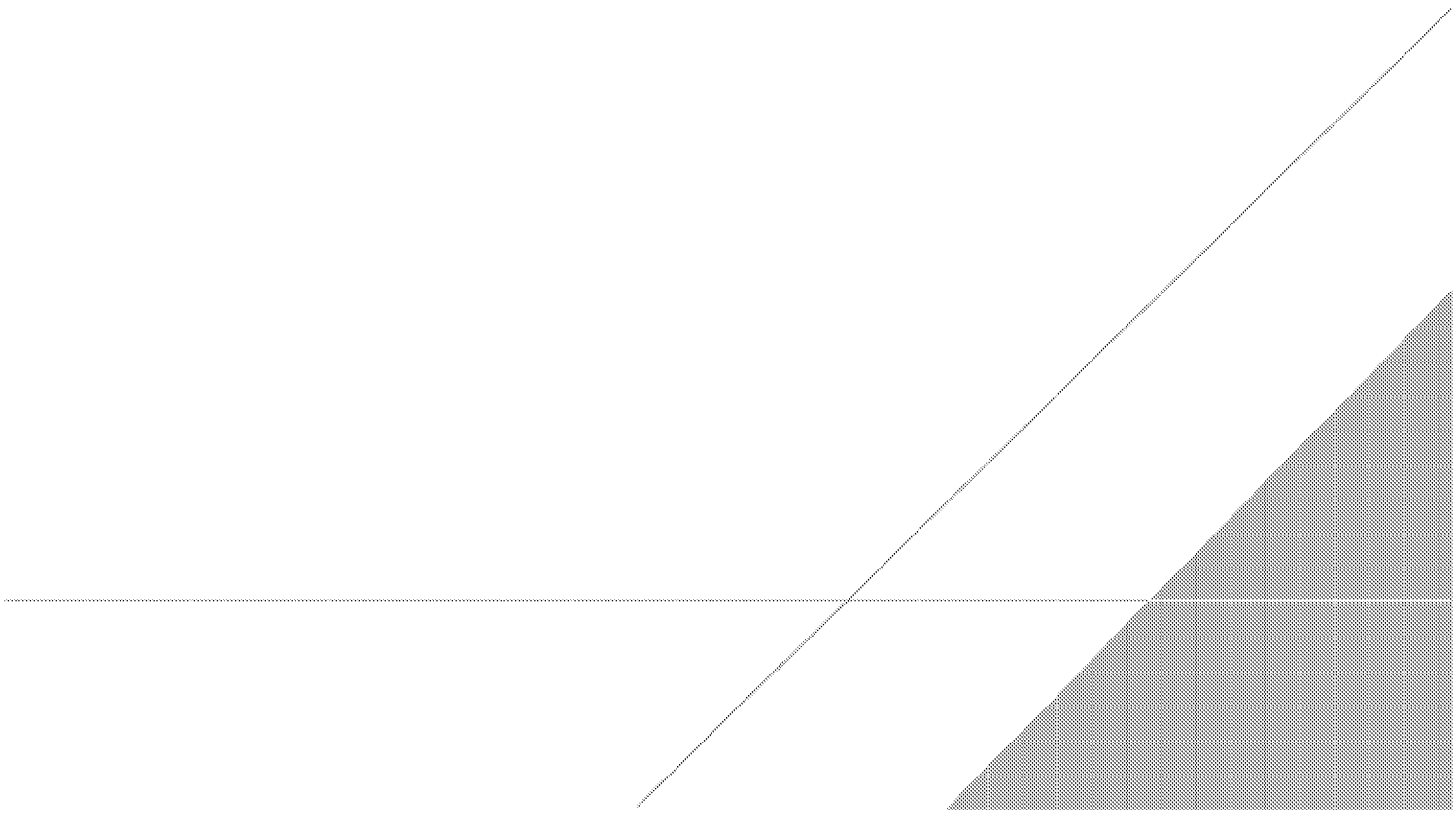

Table 1
Operational Summary, Bethpage Park
Groundwater Containment System, Operable Unit 3
(Former Grumman Settling Ponds), Bethpage, New York

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MONTH	DAY																													Days Operational (#)
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
2009 Total																																160
2010 Total																																352
2011 Total																																351
2012 Total																																353
2013 Total																																354
2014 Total																																349
Jan-15	b				(3)			b				#				b				(4)b	(5)					b				(6)	b	24
Feb-15						(7)b						#/## /*/**	b	(8)					b			(9)				b						27
Mar-15				(10) K	C	b						b							b				#			b				(11)		29
1Q 2015																																80
Apr-15	(12)		b						b							b						b					b		##			30
May-15				b	(13)	(13)b	b				b										b					##/*/**		b				31
Jun-15			b					##	b						(15) (16)b		(17)				b											28
2Q 2015																																89
Jul-15			(18)b	(19)				b									(20)bb			(21)bb		#	b						b			29
Aug-15			b								b	(22)				b			#/## /*/**					b		b						31
Sep-15	b							b						(23)	b	(24)	b		b				b				b	#				29
3Q 2015																																89
2015 Total																																258
TOTAL																																**2,177**

Table 1
Operational Summary, Bethpage Park
Groundwater Containment System, Operable Unit 3
(Former Grumman Settling Ponds), Bethpage, New York

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Legend:

	Indicates system online for at least the majority of the day.
	Indicates system operated with reduced flow rates.
	Indicates system off-line for at least the majority of the day.
#	Indicates water compliance samples were collected.
##	Indicates water performance samples were collected.
**	Indicates vapor compliance samples were collected.
*	Indicates vapor performance samples were collected.
b	Indicates filter bag unit changed over.
K	Indicates PPZ change-out.
C	Indicates carbon change-out.

Acronyms\Key:

1Q	first quarter
ECU	emission control unit
VPGAC	vapor phase granular activated carbon
PPZ	potassium permanganate-impregnated zeolite
RW	recovery well

Notes:

(1) Days in which the system was operational for the majority of the day are counted as one day.
(2) Spent bag filters are stored in DOT certified 55-gallon drums and disposed of by a subcontractor as non-hazardous waste.

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(3) The system was shut down at 10:00 am on January 5, 2015 to install Franklin Electric Submonitors for RW-2 and RW-3. The system was restarted at 3:45 pm on the same day and was offline for approximately 5.8 hours.
(4) The system was shut down at 8:45 am on January 20, 2015 to clean the bag filter effluent piping and sample tap WSP-7 of iron build-up. The system was restarted at 3:50 pm on the same day and was offline for approximately 6 hours.
(5) The system was shut down at 9:10 am on January 21, 2015 to clean iron debris from the air stripper sump. The system shut down multiple time while attempting to restart later in the day, due to an air stripper sump high level. It was determined that the alarm was caused by a high amount of iron sludge remaining in the air stripper sump. A subcontractor with a vacuum truck was used to fully evacuate the sump of any sludge and debris. The sludge and debris was disposed of by the subcontractor as non-hazardous waste. Upon completion, the system was restarted at 8:37 am on January 28, 2015 and was offline for approximately 7 days.
(6) The system was shut down at approximately 12:40 pm on January 30, 2015 to install a new check valve in the effluent piping. The system was restarted at approximately 7:00 pm on the same day. The system was offline for approximately 6.3 hours.
(7) The system shut down at 2:43 am on February 6, 2015 due to a low pressure alarm at RW-2. The system was restarted at 9:09 am on the same day and was offline for approximately 6.5 hours.
(8) The system shut down at 10:21 pm on February 14, 2015 due to a motor overload condition at RW-2 . The system was restarted without RW-2 at 12:15 pm on February 15, 2015; the system was offline for approximately 14 hours. A new recovery well pump and motor was installed in RW-2 on Feburary 19, 2015 and it was brought back online at approximatly 3:17 pm the same day. RW-2 was offline for approximately 5 days.
(9) The system shut down at 12:52 pm on February 22, 2015 due to a low pressure alarm at RW-2. The system was restarted at 1:45 pm on the same day and was offline for approximately 1 hour.
(10) The system was shut down at 2:13 pm on March 4, 2015 to change-out VPGAC and PPZ in ECUs 502 and 601, respectively. The VPGAC was transported by the subcontractor to an approved regeneration facility and the PPZ was transported to an approved receiving facility for disposal as non-hazardous waste. The system was restarted at 12:05 pm on March 6, 2015 and was offline for approximately 2 days.
(11) A leak was observed in the well vault for RW-4 at 6:56 pm on March 30, 2015. RW-4 was left offline for the remainder of the reporting period.

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Notes continued:

Second Quarter 2015

(12) A leak was observed in the RW-4 well vault at 6:56 pm on March 30, 2015 and RW-4 was left offline until the leak was repaired. RW-4 was restarted at 5:50pm on April 23, 2015 and was offline for approximately 24 days.
(13) The system was shut down at 8:15 am on May 5, 2015 to install a new pump in RW-2 and pressure test RW-1, 2, and 3. The system was restarted at 5:45 pm the same day; however, due to a motor overload condition, RW-3 was left offline.
(14) On May 6, 2015, the motor leads at RW-3 were repaired. The well was restarted at 5:30 pm on the same day and was offline for approximately 1.5 days.
(15) Recovery well RW-2 was shut down at 8:30 am on June 15, 2015 for scheduled redevelopment. RW-2 was restarted at 6:15 pm on June 22, 2015, and was offline for approximately 7.5 days.
(16) The system shut down at 2:45 pm on June 15, 2015 due to a high pressure alarm at the RW-2 influent manifold. The alarm was caused by an unseated butterfly valve during well redevelopment. The valve was seated fully and the system was restarted on at 4:45 pm on the same day. RW-2 was left offline for scheduled redevelopment. The system was offline for approximately 2 hours.
(17) The system was shut down at 10:30 am on June 17th, 2015 for routine maintenance. The system was restarted at 6:30 pm the following day and was offline for approximately 1.5 days.

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(18) The system shut down at 10:49 pm on July 3, 2015 due to a low flow alarm at the RW-3 influent manifold. The system was restarted on July 5, 2015 at approximately 3:45 pm and was offline for approximately 41 hours.
(19) The system shut down at approximately 9:30 pm on July 5, 2015 due to a low pressure alarm at the RW-3 influent manifold. The system was restarted at approximately 8:00 am on July 6, 2015; however, RW-3 was left offline. The system was offline for approximately 11 hours.
(20) The system was shut down at 7:30 am on July 16, 2015 to install a new pump and motor in RW-3 and a new motor shroud in RW-2. The system was restarted at 3:15 pm the same day, and was offline for approximately 8 hours. RW-3 was offline for a total of 13 days.
(21) The system shut down at 3:23 am on July 20, 2015 to a bag filter differential high pressure alarm resulting from multiple bag filter changes. The alarm was cleared, both of the bag filters changed and the system restarted at 10:55 am on the same day. The system was offline for approximately 10.5 hours.
(22) The system was shut down at approximately 8:05 am on August 12, 2015 to conduct pressure tests on the RW-1 and RW-2 influent pipelines. The system was restarted at approximately 5:55 pm on the same day, and was offline for approximately 10 hours.
(23) The system shut down at 12:10 am on September 14, 2015 due to a low pressure alarm at the RW-2 influent manifold. The system was restarted at approximately 2:00 pm on the same day, however, RW-2 was left offline. The system was offline for approximately 14 hours.
(24) On September 16, 2015 a new pump and motor were installed in RW-2. RW-2 was restarted at approximately 2:15 pm on the same day and was offline for approximately 2.5 days.
(25) The system shut down at 6:44 am am on September 17, 2015 to a low manifold pressure alarm. The alarm was cleared and the system restarted at approximately 8:45 am on the same day. The system was offline for approximately 2 hours.

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Table 2
Summary of Influent Water Sample Analytical Results, Bethpage Park
Groundwater Containment System, Operable Unit 3
(Former Grumman Settling Ponds), Bethpage, New York

ARCADIS Design & Consultancy for natural and built assets

Compound [1]	10/20/14 (µg/L)	11/17/14 (µg/L)	12/15/14 (µg/L)	02/12/15 (µg/L)	05/26/15 (µg/L)	08/19/15 (µg/L)
Project VOCs						
1,1,1 - Trichloroethane	ND	ND	ND	ND	ND	ND
1,1 - Dichloroethane	ND	ND	ND	0.41	**0.33**	0.26
1,2 - Dichloroethane	ND	ND	ND	ND	ND	ND
1,1 - Dichloroethene	ND	ND	ND	ND	ND	ND
Tetrachloroethene	ND	ND	ND	ND	ND	ND
Trichloroethene	**3.7**	**3.4**	**3.5**	**4.7**	**4.4**	**3.4**
Vinyl Chloride	**17**	**15**	**16**	**25**	**16**	**10.3**
cis 1,2-Dichloroethene	**11**	**9.9**	**9.0**	**14**	**11**	**8.3**
trans 1,2-Dichloroethene	ND	ND	ND	ND	ND	ND
Benzene	ND	ND	ND	ND	ND	ND
Toluene	**12**	**11**	**7.1**	**9.3**	**4.5**	**2.5**
Xylenes	1.2	1.1	0.67	1.4	0.84	ND
Subtotal Project VOCs	**45**	**40**	**36**	**55**	**37**	**25**
Non-Project VOCs						
Dichlorodifluoromethane (Freon 12)	ND	ND	ND	ND	ND	ND
Chlorodifluoromethane (Freon 22)	**12**	**11**	**11**	**12**	**7.0**	**6.2**
Subtotal Non-Project VOCs	**12**	**11**	**11**	**12**	**7.0**	**6.2**
Total VOCs [2]	**57**	**51**	**47**	**67**	**44**	**31**
Inorganics						
Total Iron	**330**	**359**	**292**	**1,810**	**467**	**981**
Total Mercury	NA	NA	NA	NA	NA	NA
pH [3]	5.6	5.7	5.8	5.3	5.7	5.6

Notes:

(1) Only VOCs associated with the interim SPDES equivalency program, plus toluene, benzene, xylenes, non-project related Freon 12 and Freon 22, mercury, and iron are included in this table. Complete VOC and inorganic data summary tables, including VOC TICs, are provided in Appendix B. Laboratory data qualifiers are included in the Appendix B tables.

(2) "Total VOCs" represents the sum of individual concentrations of the compounds detected. The values used in calculations referenced in this report have been rounded to the nearest whole number.

(3) Influent pH samples collected and measured in the field by ARCADIS personnel on the dates listed using an Oakton Model 300 pH/conductivity meter. pH units are standard units.

Acronyms\Key:

700	Bold data indicates that the analyte was detected at or above its reporting limit.
16	Data that is not bold indicates analyte detected but below its reporting limit; the value is estimated.
ASP	Analytcial Services Protocol
ELAP	Environmental Laboratory Approval Program
IRM	Interim remedial measure.
NA	Not analyzed.
ND	Analyte not detected at, or above its laboratory quantification limit.
NYSDEC	New York State Department of Environmental Conservation.
NYSDOH	New York State Department of Health
OM&M	Operation, maintenance and monitoring.
SPDES	State Pollutant Discharge Elimination System
TICs	Tentatively identified compounds.
USEPA	United States Environmental Protection Agency.
VOC	Volatile organic compound.
µg/L	Micrograms per liter.

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Table 3
Summary of Effluent Water Sample Analytical Results, Bethpage Park
Groundwater Containment System, Operable Unit 3
(Former Grumman Settling Ponds), Bethpage, New York [1]

ARCADIS Design & Consultancy for natural and built assets

Compound [1]	Discharge Limit [2] (µg/L)	10/20/14 (µg/L)	11/17/14 (µg/L)	12/15/14 (µg/L)	01/12/15 (µg/L)	02/12/15 (µg/L)	03/23/15 (µg/L)	04/29/15 (µg/L)	05/26/15 (µg/L)	06/08/15 (µg/L)	07/22/15 (µg/L)	08/19/15 (µg/L)	09/28/15 (µg/L)
Project VOCs													
1,1,1 - Trichloroethane	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1 - Dichloroethane	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2 - Dichloroethane	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1 - Dichloroethene	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethene	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Vinyl Chloride	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
cis 1,2-Dichloroethene	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
trans 1,2-Dichloroethene	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzene	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Toluene	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Xylenes	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Subtotal Project VOCs	--	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Non-Project VOCs													
Dichlorodifluoromethane (Freon 12)	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chlorodifluoromethane (Freon 22)	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Subtotal Non-Project VOCs	--	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total VOCs [3]	--	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Treatment Efficiency [4]	--	> 99.9%	> 99.9%	> 99.9%	> 99.9%	> 99.9%	> 99.9%	> 99.9%	> 99.9%	> 99.9%	> 99.9%	> 99.9%	> 99.9%
Inorganics													
Total Iron	600	**265**	**276**	**220**	**300**	**320**	**310**	**293**	**321**	**282**	**325**	**299**	**259**
Total Mercury	250	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
pH [5]	5.5 - 8.5	6.3	6.5	6.2	6.2	6.2	7.1	6.8	7.1	6.3	6.9	6.9	6.6

See notes on last page.

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Notes:

(1) Only VOCs associated with the interim SPDES equivalency program, including Toluene, Benzene, Xylenes, non-project related Freon 12 and Freon 22, Mercury and Iron are included in this table. Complete VOC and inorganic data summary tables, including VOC TICs, are provided in Appendix B. Laboratory data qualifiers are included in the Appendix B tables.

(2) Discharge limits per the interim SPDES equivalency program or Division of Water Technical and Operational Guidance Series (TOGS 1.1.1) Quality Standards and Guidance Values and Groundwater Effluent Limitations, if the compound is not part of the interim SPDES equivalency program.

(3) "Total VOCs" represents the sum of individual concentrations of compounds detected. The values used in calculations referenced in this report have been rounded to the nearest whole number.

(4) Treatment efficiency was calculated by dividing the difference between the influent and effluent total VOC concentrations by the influent total VOC concentration.

(5) Effluent pH samples collected and measured in the field by ARCADIS personnel on the dates listed using an Oakton Model 300 pH/conductivity meter. pH units are standard units.

Acronyms\Key:

700	Bold box indicates value is greater than discharge criterion.
700	Bold data indicates that the analyte was detected at or above its reporting limit.
16	Data that is not bold indicates analyte detected but below its reporting limit; the value is estimated.
ASP	Analytical Services Protocol.
ELAP	Environmental Laboratory Approval Program
IRM	Interim remedial measure.
ND	Analyte not detected at, or above its laboratory quantification limit.
NYSDEC	New York State Department of Environmental Conservation.
NYSDOH	New York State Department of Health
OM&M	Operation, maintenance, and monitoring.
SPDES	State Pollutant Discharge Elimination System
TICs	Tentatively identified compounds.
USEPA	United States Environmental Protection Agency.
VOC	Volatile organic compound.
µg/L	Micrograms per liter.
--	Not applicable.

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Table 4
Summary of Influent Vapor Sample Analytical Results, Bethpage Park
Groundwater Containment System, Operable Unit 3
(Former Grumman Settling Ponds), Bethpage, New York [1]

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Compound [2]	11/17/2014 (µg/m³)	2/12/2015 (µg/m³)	5/26/2015 (µg/m³)	08/19/15 (µg/L)
Project VOCs				
1,1,1 - Trichloroethane	**0.82**	**0.87**	ND	**0.82**
1,1 - Dichloroethane	**4.9**	**5.3**	**5.7**	**4.5**
1,2 - Dichloroethane	ND	**0.40**	ND	ND
1,1 - Dichloroethene	**1.6**	**3.4**	**2.3**	**1.4**
Tetrachloroethene	**3.6**	**5.4**	**4.2**	**3.6**
Trichloroethene	**47**	**63**	**72**	**59**
Vinyl Chloride	**187**	**250**	**204**	**125**
cis 1,2-Dichloroethene	**150**	**220**	**199**	**147**
trans 1,2-Dichloroethene	ND	0.48	ND	0.40
Benzene	**1.1**	**1.6**	**3.0**	**4.8**
Toluene	**180**	**140**	**76**	**49**
Xylenes	**21**	**20**	**15**	**10**
Subtotal Project VOCs	**597**	**710**	**581**	**405**
Non-Project VOCs				
Dichlorodifluoromethane (Freon 12)	**3.0**	**2.8**	**2.9**	**2.7**
Chlorodifluoromethane (Freon 22)	**120**	**101**	**87**	**69**
Subtotal Non-Project VOCs	**123**	**104**	**90**	**72**
Total VOCs [3]	**720**	**814**	**671**	**477**

See notes on last page.

ED_002631A_00010847-00025

Notes:

(1) Vapor samples collected by ARCADIS on the dates shown and submitted to a NYSDOH ELAP certified laboratory for VOC analyses per Modified USEPA Method TO-15. A VOC analyte list is provided in the DRAFT Groundwater IRM OM&M Manual (ARCADIS 2009). Influent samples were collected at Vapor Sampling Port-1 (VSP-1); refer to Figure 3 of this OM&M Report for the location of VSP-1.

(2) Only VOCs that are associated with the interim SPDES equivalency program, Toluene, Benzene, Xylenes, and non-project related Freon 12 and Freon 22 are included in this table. Complete VOC summary tables, including VOC TICs, are provided in Appendix C. Laboratory data qualifiers are included in the Appendix C tables.

(3) "Total VOCs" represents the sum of individual concentrations of compounds detected. The values used in calculations referenced in this report have been rounded to the nearest whole number.

Acronyms\Key:

700	Bold data indicates that the analyte was detected at or above its reporting limit.
16	Data that is not bold indicates analyte detected but below its reporting limit; the value is estimated.
ELAP	Environmental Laboratory Approval Program
IRM	Interim remedial measure.
ND	Analyte not detected at or above its laboratory reporting limit.
NYSDOH	New York State Department of Health
OM&M	Operation, maintenance, and monitoring.
R	The sample results are rejected.
SPDES	State Pollutant Discharge Elimination System
TICs	Tentatively identified compounds.
USEPA	United States Environmental Protection Agency.
VOC	Volatile organic compound.
$\mu g/m^3$	Micrograms per cubic meter.

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Table 5
Summary of Effluent Vapor Sample Analytical Results, Bethpage Park
Groundwater Containment System, Operable Unit 3
(Former Settling Ponds), Bethpage, New York [1]

ARCADIS Design & Consultancy for natural and built assets

Compound [2]	Discharge Limit [3] ($\mu g/m^3$)	11/17/2014 ($\mu g/m^3$)	2/12/2015 ($\mu g/m^3$)	5/26/2015 ($\mu g/m^3$)	08/19/15 ($\mu g/L$)
Project VOCs					
1,1,1 - Trichloroethane	9,000	ND	ND	ND	ND
1,1 - Dichloroethane	NS	**8.5**	**5.3**	ND	ND
1,2 - Dichloroethane	NS	ND	ND	ND	ND
1,1 - Dichloroethene	380 [4]	**1.2**	**1.3**	ND	ND
Tetrachloroethene	1,000	**10**	**0.81**	**3.7**	**0.40**
Trichloroethene	14,000	**2.6**	**4.4**	**2.7**	**1.8**
Vinyl Chloride	180,000	**42**	**98**	ND	**14**
cis 1,2-Dichloroethene	190,000 [5]	**144**	**230**	ND	**3.3**
trans 1,2-Dichloroethene	NS	ND	ND	ND	ND
Benzene	1,300	ND	**5.1**	**4.5**	**37**
Toluene	37,000	**19**	**11**	**20**	**7.5**
Xylenes	4,300	1.6	1.5	**6.5**	**4.3**
Subtotal Project VOCs	NA	**229**	**357**	**37**	**68**
Non-Project VOCs					
Dichlorodifluoromethane (Freon 12)	NS	**3.0**	**2.6**	**2.9**	**3.0**
Chlorodifluoromethane (Freon 22)	NS	**122**	**103**	**91**	**69**
Subtotal Non-Project VOCs	NA	**125**	**106**	**94**	**72**
Total VOCs [6]	NA	**354**	**463**	**131**	**140**
Treatment Efficiency (Total VOCs) [7]	NA	**50.9%**	**43.1%**	**80.5%**	**70.6%**
Treatment Efficiency (Project VOCs) [8]	NA	**61.7%**	**49.7%**	**93.6%**	**83.2%**

See notes on last page.

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Notes:

(1) Vapor samples collected by ARCADIS on the dates shown and submitted to a NYSDOH ELAP certified laboratory for VOC analyses per Modified USEPA Method TO-15. A VOC analyte list is provided in the DRAFT Groundwater IRM OM&M Manual (ARCADIS 2009). Effluent samples were collected at Vapor Sampling Port-5 (VSP-5); refer to Figure 3 of this OM&M Report for the location of VSP-5.

(2) Only VOCs that are associated with the interim SPDES equivalency program, Toluene, Benzene, Xylenes, and non-project related Freon 12 and Freon 22 are included in this table. Complete VOC summary tables, including VOC TICs, are provided in Appendix C. Laboratory data qualifiers are included in the Appendix C tables.

(3) Discharge limit is compound-specific SGC per the NYSDEC DAR-1 AGC/SGC tables revised Februaury 28, 2014.

(4) An SGC was not provided in the DAR-1 AGC/SGC Tables, dated February 28, 2014. An interim SGC was developed based on guidance of the New York State DAR-1 Guidelines for the Control of Toxic Ambient Air Contaminants, 1991 edition. Specifically for 1,1- dichloroethene, which is not defined as provided in Section IV.A.2.b.1 a high-toxicity compound, the Interim SGC = (smaller of Time Weighted Average [TWA] - Threshold Limit Value or TWA - Recommended Exposure Limit)/4.2. or 1,600 $\mu g/m^3$ / 4.2 = approximately 380 $\mu g/m^3$. An interim SGC was developed for this compound because it has a moderate toxicity rating, as specified in the DAR-1 AGC/SGC Tables, dated February 28, 2014.

(5) An SGC was not provided in the DAR-1 AGC/SGC Tables, dated February 28, 2014. An interim SGC was developed based on guidance provided in Section IV.A.2.b.1 of the New York State DAR-1 Guidelines for the Control of Toxic Ambient Air Contaminants, 1991 edition. Specifically for cis-1,2 dichloroethene, which is not defined as a high-toxicity compound, the interim SGC = (smaller of Time Weighted Average [TWA] - Threshold Limit Value or TWA - Recommended Exposure Limit)/4.2 or 790,000 $\mu g/m^3$ / 4.2 = approximately 190,000 $\mu g/m^3$. An interim SGC was developed for this compound because it has a moderate toxicity rating, as specified in the DAR-1 AGC/SGC Tables, dated February 28, 2014.

(6) "Total VOCs" represents the sum of individual concentrations of all compounds detected. The values used in calculations referenced in this report have been rounded to the nearest whole number.

(7) Treatment efficiency was calculated by dividing the difference between the influent and effluent Total VOC concentrations by the influent Total VOC concentration. Treatment efficiency is only calculated when there is a corresponding influent sample.

(8) Treatment efficiency was calculated by dividing the difference between the influent and effluent total Project VOC concentrations by the influent total Project VOC concentration. Treatment efficiency is only calculated when there is a corresponding influent sample.

Acronyms\Key:

700	Bold data indicates that the analyte was detected at or above its reporting limit.
16	Data that is not bold indicates analyte detected but below its reporting limit; the value is estimated.
AGC	Annual guideline concentration.
DAR-1	Division of Air Resources Air Guidance-1
ELAP	Environmental Laboratory Approval Program
IRM	Interim remedial measure.
NA	Not applicable.
ND	Analyte not detected at or above its laboratory reporting limit.
NS	Guideline concentrations not specified in the NYSDEC DAR-1 AGC/SGC tables. An interim SGC was not developed for these compounds because they have low toxicity ratings in the NYSDEC DAR-1 AGC/SGC tables revised February 28, 2014.
NYSDEC	New York State Department of Environmental Conservation.
NYSDOH	New York State Department of Health
OM&M	Operation, maintenance, and monitoring.
SGC	Short-term Guidance Concentration
SPDES	State Pollutant Discharge Elimination System
TICs	Tentatively identified compounds.
USEPA	United States Environmental Protection Agency.
VOC	Volatile organic compound.
$\mu g/m^3$	Micrograms per cubic meter.

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Table 6
Summary of System Parameters, Bethpage Park
Groundwater Containment System, Operable Unit 3
(Former Settling Ponds), Bethpage, New York

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Date [1]	Water Flow Rates						Water Pressures [2]					Air Flow Rate [2]	Air Pressures [5]					Air Temp. [5]
	Remedial Well [3]				Combined Influent [3]	Effluent [2]	Remedial Well Effluent [4]				Effluent	Effluent	ECU Influents				Effluent	Effluent
	RW-1 (gpm)	RW-2 (gpm)	RW-3 (gpm)	RW-4 (gpm)	(gpm)	(gpm)	RW-1 (psi)	RW-2 (psi)	RW-3 (psi)	RW-4 (psi)	(psi)	(scfm)	GAC-501 (iwc)	GAC-502 (iwc)	PPZ-601 (iwc)	PPZ-602 (iwc)	(iwc)	(°R)
10/20/14	30.1	70.2	75.0	30.4	206	233	58	22	57	56	10	1,918	4.8	5.1	3.1	1.5	0.0	536
11/17/14	30.8	57.6	75.6	30.7	195	230	57	4	52	56	36	1,944	4.8	5.0	2.9	0.5	0.0	530
12/15/14	30.5	51.7	75.3	30.6	188	223	58	4	52	56	12	1,929	4.5	5.3	3.0	0.6	0.0	532
01/12/15	30.6	76.6	75.6	30.9	214	228	58	45	48	56	13	1,946	4.0	4.9	2.8	0.6	0.0	526
02/12/15	31.8	74.2	75.5	31.1	213	241	57	39	44	56	23	1,891	4.1	7.4	2.6	0.5	0.0	527
03/23/15	30.3	74.9	75.0	29.8	210	237	58	47	42	57	13	1,839	10.5	6.5	0.5	1.5	0.0	528
04/29/15	30.6	75.3	75.5	30.3	212	249	58	23	41	58	9	1,750	11.6[6]	7.2[6]	0.5[6]	1.6[6]	0.0[6]	532[6]
05/26/15	30.9	75.9	75.2	30.2	212	229	58	59	48	58	13	1,819	6.6	2.5	0.8	2.0	0.0	542
06/08/15	30.2	75.1	75.0	29.8	210	225	58	58	49	58	15	1,802	6.5	2.5	0.8	2.0	0.0	539
07/22/15	29.6	75.0	75.6	29.7	210	214	57	28	44	56	12	1,835	6.5	3.2	1.0	2.0	0.0	544
08/19/15	30.2	72.6	77.8	30.1	211	217	57	26	40	56	10	1,790	6.5[7]	2.5[7]	0.6[7]	2.0[7]	0.0[7]	544[7]
09/28/15	29.4	74.6	74.3	29.6	208	221	57	21	37	56	11	1,872	6.7[8]	2.8[8]	0.5[8]	2.0[8]	0.0[8]	540[8]

See notes on last page.

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Notes:

(1) Operational data collected by ARCADIS on days noted. Parameters listed were typically recorded during compliance monitoring events. Data in this table correspond to approximately the past year of system operation.
(2) Instantaneous parameters obtained from the SCADA HMI: Water Flow Rate, Water Pressure, Air Flow Rate.
(3) Combined influent water-flow rate is the sum of individual well flow rates via the SCADA System.
(4) Remedial Well effluent pressure readings measured at the influent manifold within the treatment system building.
(5) Instantaneous values from field-mounted instruments
(6) Values collected on April 27, 2015 during the weekly site visit. No values collected on day of sampling.
(7) Values collected on August 24, 2015 during the weekly site visit. No values collected on day of sampling.
(8) Values collected on October 5, 2015 during the weekly site visit. No values collected on day of sampling.

Acronyms\Key:

ECU	Emission control unit.
gpm	Gallons per minute.
HMI	Human-machine interface.
iwc	Inches of water column.
psi	Pounds per square inch.
^{o}R	Degrees Rankine.
SCADA	Supervisory Control and Data Acquisition
scfm	Standard cubic feet per minute.
Temp.	Temperature.

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Table 7
Summary of Groundwater Recovered, VOC Mass Recovered, and VOC Mass Recovery Rates
Bethpage Park Groundwater Containment System, Operable Unit 3
(Former Grumman Settling Ponds) Bethpage, New York

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Operating Period [1]	Volume of Groundwater Recovered (x1,000 gal) [2]					VOC Mass Recovered (lbs) [3]														
						Total VOCs [4]					Project VOCs [5]					Non-Project VOCs [7]				
	RW-1	RW-2	RW-3	RW-4	Total	RW-1	RW-2	RW-3	RW-4	Total	RW-1	RW-2	RW-3	RW-4	Total	RW-1	RW-2	RW-3	RW-4	Total
System Pilot Test, Shakedown and Startup Totals [8]	137	270	251	150	808	NA	NA	NA	NA	1.1	NA	NA	NA	NA	1.0	NA	NA	NA	NA	0.1
2009 Totals	6,592	13,838	16,445	6,574	43,449	0.17	275	53	14	342	0.17	273	19	0.20	293	<0.01	0.56	35	13	48
2010 Totals	15,726	35,127	38,160	15,689	104,702	0.56	172	412	89	672	0.56	171	28	0.10	200	<0.01	0.17	383	89	469
2011 Totals	15,218	36,570	37,682	15,196	104,666	0.36	167	271	78	516	0.36	167	35	0.09	203	<0.01	1.1	236	78	314
2012 Totals	15,260	35,178	36,111	15,336	101,885	0.28	114	113	40	267	0.25	113	12	0.39	126	<0.01	1.5	101	40	141
2013 Totals	15,968	37,514	36,622	16,036	106,140	0.14	111	41	18	171	0.14	110	4.3	0.36	113	<0.01	1.6	37	18	57
2014 Totals	15,690	33,222	31,199	15,691	95,802	0.063	67	9.9	8.1	85	0.063	65	13.2	0.20	67	<0.01	1.5	8.1	7.9	17
January 2015 through March 2015 Totals																				
01/01/15 - 02/01/15	1,072	2,676	2,429	1,071	7,248	<0.01	4.4	0.65	0.47	5.5	<0.01	4.2	0.14	0.017	4.4	<0.01	0.12	0.51	0.45	1.1
02/01/15 - 03/01/15	1,248	2,643	2,807	1,248	7,946	<0.01	4.3	0.75	0.55	5.6	<0.01	4.2	0.16	0.020	4.4	<0.01	0.11	0.59	0.52	1.2
03/01/15 - 04/01/15	1,337	3,341	3,007	1,268	8,953	<0.01	5.4	0.80	0.55	6.8	<0.01	5.3	0.17	0.021	5.5	<0.01	0.14	0.64	0.53	1.3
Subtotal Jan - Mar 2015 [9]	3,657	8,660	8,243	3,587	24,147	0.0094	14	2.2	1.6	18	0.0095	14	0.47	0.058	14	<0.01	0.37	1.7	1.5	3.6
April 2015 through June 2015 Totals																				
04/01/15 - 05/01/15	1,382	3,455	3,110	348	8,295	<0.01	4.0	0.68	0.10	4.8	<0.01	3.9	0.14	<0.01	4.0	<0.01	0.28	0.54	0.10	0.92
05/01/15 - 06/01/15	1,410	3,522	3,123	1,410	9,465	<0.01	4.1	0.68	0.41	5.2	<0.01	4.0	0.14	0.022	4.2	<0.01	0.13	0.54	0.39	1.1
06/01/15 - 07/01/15	1,318	2,601	3,036	1,318	8,273	<0.01	3.0	0.66	0.39	4.1	<0.01	2.9	0.14	0.021	3.1	<0.01	0.093	0.53	0.37	1.0
Subtotal Apr - Jun 2015 [10]	4,110	9,578	9,269	3,076	26,033	0.012	11	2.0	0.90	14	0.012	11	0.42	0.043	11	<0.01	0.50	1.6	0.90	3.0
July 2015 through September 2015 Totals																				
07/01/15 - 08/01/15	1,301	3,252	1,980	1,301	7,834	<0.01	2.5	0.39	0.34	3.2	<0.01	2.4	0.068	0.016	2.5	<0.01	0.12	0.34	0.36	0.82
08/01/15 - 09/01/15	1,408	3,520	3,309	1,408	9,645	<0.01	2.7	0.65	0.37	3.7	<0.01	2.6	0.11	0.018	2.7	<0.01	0.13	0.57	0.39	1.1
09/01/15 - 10/01/15	1,346	3,135	3,029	1,346	8,856	<0.01	2.4	0.60	0.35	3.4	<0.01	2.3	0.10	0.017	2.4	<0.01	0.11	0.53	0.37	1.0
Subtotal July - Sept 2015 [11]	4,055	9,907	8,318	4,055	26,335	0.011	7.6	1.6	1.1	10	<0.01	7.3	0.28	0.051	7.6	0.007	0.36	1.4	1.1	2.9
2015 Totals	11,822	28,145	25,830	10,718	76,515	0.033	33	5.8	3.6	42	0.021	32	1.2	0.15	33	0.007	1.2	4.8	3.5	9.5
Total [12]	96,413	219,864	222,300	95,390	633,967	1.6	938	906	251	2,096	1.6	931	112	1.5	1,036	0.007	7.7	805	249	1,055

See notes on last page.

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Operating Period [1]	VOC Mass Recovery Rate (lbs/day) [2]														
	Total VOCs [5]					Project VOCs [6]					Non-Project VOCs [7]				
	RW-1	RW-2	RW-3	RW-4	Total	RW-1	RW-2	RW-3	RW-4	Total	RW-1	RW-2	RW-3	RW-4	Total
System Pilot Test, Shakedown and Startup Totals [8]	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2009 Totals	<0.01	1.7	0.33	0.086	2.1	<0.01	1.7	0.12	<0.01	1.8	<0.01	<0.01	0.22	0.080	0.30
2010 Totals	<0.01	0.46	1.1	0.24	1.8	<0.01	0.46	0.075	<0.01	0.54	<0.01	<0.01	1.0	0.24	1.3
2011 Totals	<0.01	0.45	0.73	0.21	1.4	<0.01	0.45	0.095	<0.01	0.55	<0.01	<0.01	0.64	0.21	0.85
2012 Totals	<0.01	0.31	0.31	0.11	0.73	<0.01	0.31	0.032	<0.01	0.35	<0.01	<0.01	0.28	0.11	0.39
2013 Totals	<0.01	0.30	0.11	0.050	0.47	<0.01	0.30	0.012	<0.01	0.31	<0.01	<0.01	0.10	0.049	0.16
2014 Totals	<0.01	0.19	0.028	0.023	0.24	<0.01	0.18	<0.01	<0.01	0.19	<0.01	<0.01	0.023	0.022	0.047
January 2015 through March 2015 Totals															
01/01/15 - 02/01/15	<0.01	0.14	0.021	0.015	0.18	<0.01	0.14	<0.01	<0.01	0.14	<0.01	<0.01	0.016	0.015	0.035
02/01/15 - 03/01/15	<0.01	0.15	0.027	0.020	0.20	<0.01	0.15	<0.01	<0.01	0.16	<0.01	<0.01	0.021	0.019	0.043
03/01/15 - 04/01/15	<0.01	0.18	0.026	0.018	0.22	<0.01	0.17	<0.01	<0.01	0.18	<0.01	<0.01	0.021	0.017	0.042
Subtotal Jan - Mar 2015 [9]	<0.01	0.16	0.024	0.018	0.20	<0.01	0.16	<0.01	<0.01	0.16	<0.01	<0.01	0.019	0.017	0.040
April 2015 through June 2015 Totals															
04/01/15 - 05/01/15	<0.01	0.13	0.023	<0.01	0.16	<0.01	0.13	<0.01	<0.01	0.13	<0.01	<0.01	0.018	<0.01	0.031
05/01/15 - 06/01/15	<0.01	0.13	0.022	0.013	0.17	<0.01	0.13	<0.01	<0.01	0.14	<0.01	<0.01	0.017	0.013	0.035
06/01/15 - 07/01/15	<0.01	0.10	0.022	0.013	0.14	<0.01	0.10	<0.01	<0.01	0.10	<0.01	<0.01	0.018	0.012	0.033
Subtotal Apr - Jun 2015 [10]	<0.01	0.12	0.022	0.010	0.15	<0.01	0.12	<0.01	<0.01	0.12	<0.01	<0.01	0.018	0.010	0.033
July 2015 through September 2015 Totals															
07/01/15 - 08/01/15	<0.01	0.081	0.013	0.011	0.10	<0.01	0.077	<0.01	<0.01	0.081	<0.01	<0.01	0.011	0.012	0.026
08/01/15 - 09/01/15	<0.01	0.087	0.021	0.012	0.12	<0.01	0.084	<0.01	<0.01	0.087	<0.01	<0.01	0.018	0.013	0.035
09/01/15 - 10/01/15	<0.01	0.080	0.020	0.012	0.11	<0.01	0.077	<0.01	<0.01	0.080	<0.01	<0.01	0.018	0.012	0.033
Subtotal July - Sept 2015 [11]	<0.01	0.083	0.017	0.012	0.11	<0.01	0.079	<0.01	<0.01	0.083	<0.01	<0.01	0.016	0.012	0.032
2015 Totals	<0.01	0.36	0.063	0.040	0.46	<0.01	0.36	<0.01	<0.01	0.36	<0.01	<0.01	0.053	0.039	0.11
Total [12]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

See notes on last page.

Notes:

(1) Represents operating period between consecutive monitoring events.

(2) Volume of groundwater recovered is based on individual local well totalized flow readings. Listed value is the difference between totalized flow values recorded between consecutive monitoring events. The total groundwater recovered during a given operating period is the sum of the individual well flow totals. Values shown are rounded to the nearest gallon, but should only be considered accurate to two significant figures to account for error associated with field measurements.

(3) Mass recovered per well was calculated by multiplying the Total VOC concentration from the most recent sampling event by the number of gallons extracted during the reporting period. The total amount recovered during a given operating period is the sum of masses recovered from each of the individual wells. Values less than ten pounds are presented using two significant figures and values greater than ten pounds have been rounded to the nearest whole number; however, these values should only be considered accurate to two significant figures to account for error associated with field measurements and analytical data.

(4) Mass recovery rates were calculated by dividing the total mass recovered for each well and for the system by the number of days in the respective operating period. Values are presented using two significant figures.

(5) "Total VOCs" represents the sum of individual concentrations of the VOCs detected.

(6) "Project VOCs" represents the sum of individual compound concentrations of 1,1,1-trichloroethane; 1,1-dichloroethane; 1,2-dichloroethane; 1,1-dichloroethene; tetrachloroethene; trichloroethelyene; vinyl chloride; cis-1,2-dichloroethene; trans-1,2-dichloroethene; benzene; toluene; and xylenes-o,m, p.

(7) "Non-Project VOCs" represents the difference between Total VOCs and Project VOCs.

(8) Values based on operational data recorded prior to system startup on July 21, 2009.

(9) The volume of groundwater recovered and mass recovered calculations represent the operational period between January 1, 2015 and April 1, 2015.

(10) The volume of groundwater recovered and mass recovered calculations represent the operational period between April 1, 2015 and July 1, 2015.

(11) The volume of groundwater recovered and mass recovered calculations represent the operational period between July 1, 2015 and October 1, 2015.

(12) "Total" refers to the amounts removed by the Operable Unit 3 Bethpage Park Groundwater Containment System.

Acronyms\Key:

IRM	Interim Remedial Measure.
gal	Gallons.
HMI	Human-machine interface.
lbs	Pounds.
lbs/day	Pounds per day.
--	Not applicable.

Table 8
Summary of Air Emissions Model Output, Bethpage Park
Groundwater Containment System, Operable Unit 3
(Former Grumman Settling Ponds), Bethpage, New York

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Compound	AGC [1] ($\mu g/m^3$)	Percent of MASC Per Event [2]				Percent AGC [2]
		11/22/14	2/12/15	5/26/15	8/13/15	
1,1,1 - Trichloroethane	5,000	0.00%	0.00%	0.00%	0.00%	0.00%
1,1 - Dichloroethane	0.63	0.21%	0.13%	0.00%	0.00%	0.07%
1,2 - Dichloroethane	0.038	0.00%	0.00%	0.00%	0.00%	0.00%
1,1 - Dichloroethene	200	0.00%	0.00%	0.00%	0.00%	0.00%
2-Butanone	5,000	0.00%	0.00%	0.00%	0.00%	0.00%
Acetone	30,000	0.00%	0.00%	0.00%	0.00%	0.00%
Chloroform	14.7	0.03%	0.03%	0.01%	0.01%	0.02%
Ethylbenzene	1,000	0.00%	0.00%	0.00%	0.00%	0.00%
Xylenes (o)	100	0.00%	0.00%	0.00%	0.00%	0.00%
Xylenes (m,p)	100	0.00%	0.00%	0.00%	0.00%	0.00%
Chloromethane	90	0.00%	0.00%	0.00%	0.00%	0.00%
Methylene Chloride	60	0.00%	0.00%	0.00%	0.00%	0.00%
Tetrachloroethene	4.0	0.04%	0.00%	0.01%	0.00%	0.01%
Trichloroethene	0.2	0.20%	0.34%	0.21%	0.14%	0.22%
Vinyl Chloride	0.068	9.5%	22.40%	0.00%	3.15%	8.06%
cis 1,2 Dichloroethene	63	0.04%	0.06%	0.00%	0.00%	0.02%
trans 1,2 Dichloroethene	63	0.00%	0.00%	0.00%	0.00%	0.00%
Benzene	0.13	0.00%	0.61%	0.54%	4.32%	1.47%
Toluene	5,000	0.00%	0.00%	0.00%	0.00%	0.00%
2-Hexanone	30	0.00%	0.00%	0.00%	0.00%	0.00%
Trichlorofluoromethane (Freon 11)	5,000	0.00%	0.00%	0.00%	0.00%	0.00%
Dichlorodifluoromethane (Freon 12)	12,000	0.00%	0.00%	0.00%	0.00%	0.00%
Chlorodifluoromethane (Freon 22)	50,000	0.00%	0.00%	0.00%	0.00%	0.00%
Trichlorotrifluoroethane (Freon 113)	180,000	0.00%	0.00%	0.00%	0.00%	0.00%

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Notes:

(1) Compound-specific AGC values per the NYSDEC DAR-1 AGC/SGC tables, revised February 28, 2014. NYSDEC DAR-1 AGCs were scaled using the results of a site-specific annual USEPA SCREEN 3 model to calculate the annual MASC per monitoring event.

(2) Percent of AGC (or Percent MASC) was calculated by dividing the actual effluent concentration by the site-specific annual MASC. Detailed calculations are included in Appendix D.

(3) Percent AGC is the 12-month average at the end of the reporting period. The Percent AGC was calculated by time-weighting the "Percent MASCs" for the individual sampling events over the past year. MASCs are typically calculated once per quarter, thus the MASCs for each month within a quarter are assumed to be the same.

Acronyms\Key:

AGC	Annual Guideline Concentration.
DAR-1	Division of Air Resources Air Guidance-1.
MASC	Maximum allowable stack concentration.
NYSDEC	New York State Department of Environmental Conservation.
SGC	Short-term Guideline Concentration.
USEPA	U.S. Environmental Protection Agency
VOC	Volatile organic compound
$\mu g/m^3$	micrograms per cubic meter

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Table 8
Concentrations of Volatile Organic Compounds in Groundwater
Samples Collected from Remedial Wells, Bethpage Park
Groundwater Containment System, Operable Unit 3
(Former Settling Ponds), Bethpage, New York [1]

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Sample Location: / COMPOUND / (ppb)	Sample Date:	RW-1 11/14/2013	RW-1 2/18/2014	RW-1 5/5/2014	RW-1 10/1/2014	RW-1 11/17/2014	RW-1 2/12/2015	RW-1 5/26/2015	RW-1 8/18/2015	RW-2 11/14/2013	RW-2 2/18/2014	RW-2 5/5/2014	RW-2 10/1/2014	RW-2 11/17/2014	RW-2 2/12/2015
	NYSDEC SCGs														
1,1,1-Trichloroethane	5	< 5.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 1.0	< 1.0 U	< 1.0 U	< 1.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 1.0	< 1.0 U
1,1,2,2-Tetrachloroethane	5	< 5.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 1.0	< 1.0 U	< 1.0 U	< 1.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 1.0	< 1.0 U
1,1,2-Trichloroethane	1	< 5.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 1.0	< 1.0 U	< 1.0 U	< 1.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 1.0	< 1.0 U
1,1-Dichloroethane	5	< 5.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 1.0	< 1.0 U	< 1.0 U	< 1.0 U	**1.0 J**	**1.1 J**	**1.1 J**	**0.85 J**	**0.94 J**	**1.1**
1,1-Dichloroethene	5	< 5.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 1.0	< 1.0 U	< 1.0 U	< 1.0 U	**0.54 J**	**0.79 J**	**0.78 J**	< 5.0 U	< 1.0	**0.95 J**
1,2-Dichloroethane	0.6	< 5.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 1.0	< 1.0 U	< 1.0 U	< 1.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 1.0	< 1.0 U
1,2-Dichloropropane	1	< 5.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 1.0	< 1.0 U	< 1.0 U	< 1.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 1.0	< 1.0 U
2-Butanone	NE	< 50 U	< 50 U	< 50 U	< 50 U	< 10	< 10 U	< 10 U	< 10 U	< 50 U	< 50 U	< 50 U	< 50 U	< 10	< 10 U
4-methyl-2-pentanone	50	< 50 U	< 50 U	< 50 U	< 50 U	< 5.0	< 5.0 U	< 5.0 U	< 5.0 U	< 50 U	< 50 U	< 50 U	< 50 U	< 5.0	< 5.0 U
Acetone	NE	< 50 U	< 50 U	< 50 U	< 50 U	< 10	< 5.0 U	< 10 U	< 10 U	< 50 U	< 50 U	< 50 U	< 50 U	< 10	< 5.0 U
Benzene	1	< 0.70 U	< 0.70 U	< 0.70 U	< 0.70 U	< 1.0	< 10 U	< 0.50 U	< 0.50 U	< 0.70 U	< 0.70 U	< 0.70 U	< 0.70 U	< 1.0	< 10 U
Bromodichloromethane	50	< 5.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 1.0	< 1.0 U	< 1.0 U	< 1.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 1.0	< 1.0 U
Bromoform	50	< 5.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 4.0	< 1.0 U	< 1.0 U	< 1.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 4.0	< 1.0 U
Bromomethane	5	< 5.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 2.0	< 4.0 U	< 2.0 U	< 2.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 2.0	< 4.0 U
Carbon Disulfide	60	< 5.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 2.0	< 2.0 U	< 2.0 U	< 2.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 2.0	< 2.0 U
Carbon tetrachloride	5	< 5.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 1.0	< 2.0 U	< 1.0 U	< 1.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 1.0	< 2.0 U
Chlorobenzene	5	< 5.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 1.0	< 1.0 U	< 1.0 U	< 1.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 1.0	< 1.0 U
Chlorodibromomethane	50	< 5.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 1.0	< 1.0 U	< 1.0 U	< 1.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 1.0	< 1.0 U
Chlorodifluoromethane (Freon 22)	NE	< 5.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 5.0	< 5.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 5.0	< 5.0 U
Chloroethane	5	< 5.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 1.0	< 1.0 U	< 1.0 U	< 1.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 1.0	< 1.0 U
Chloroform	7	< 5.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 1.0	< 1.0 U	< 1.0 U	**0.20 J**	**2.0 J**	**2.2 J**	**1.7 J**	**2.8 J**	**2.3**	**2.4**
Chloromethane	5	< 5.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 1.0	< 1.0 U	< 1.0 U	< 1.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 1.0	< 1.0 U
cis-1,2-dichloroethene	5	**0.25 J**	< 5.0 U	**0.21 J**	< 5.0 U	< 1.0	< 1.0 U	< 1.0 U	< 1.0 U	**100**	**130**	**100**	**51**	**44**	**47.7**
cis-1,3-dichloropropene	0.4	< 5.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 1.0	< 1.0 U	< 1.0 U	< 1.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 1.0	< 1.0 U
Dichlorodifluoromethane (Freon 12)	5	< 5.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 5.0	< 1.0 U	< 2.0 U	< 2.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 5.0	< 1.0 U
Dichloromethane	5	< 5.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 2.0	< 5.0 U	< 2.0 U	< 2.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 2.0	< 5.0 U
Ethylbenzene	5	< 5.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 1.0	< 1.0 U	< 1.0 U	< 1.0 U	**2.9 J**	**4.0 J**	**2.5 J**	**2.9 J**	**3.5**	**2.8**
Methyl N-Butyl Ketone	50	< 50 U	< 50 U	< 50 U	< 50 U	< 5.0	< 1.0 U	< 5.0 U	< 5.0 U	< 50 U	< 50 U	< 50 U	< 50 U	< 5.0	< 1.0 U
Methyl tert-Butyl Ether	5	< 5.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 1.0	< 2.0 U	< 1.0 U	< 1.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 1.0	< 2.0 U
Styrene	5	< 5.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 5.0	< 5.0 U	< 1.0 U	< 1.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 5.0	< 5.0 U
Tetrachloroethene	5	< 5.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 1.0	< 1.0 U	< 1.0 U	< 1.0 U	**0.25 J**	**0.25 J**	< 5.0 U	< 5.0 U	< 1.0	< 1.0 U
Toluene	5	< 5.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 1.0	< 1.0 U	< 1.0 U	< 1.0 U	**84**	**85**	**63**	**46**	**55**	**34.3**
trans-1,2-dichloroethene	5	< 5.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 1.0	< 1.0 U	< 1.0 U	< 1.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 1.0	< 1.0 U
trans-1,3-dichloropropene	0.4	< 5.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 1.0	< 1.0 U	< 1.0 U	< 1.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 1.0	< 1.0 U
Trichloroethylene	5	**0.77 J**	**0.67 J**	**0.41 J**	**0.34 J**	**0.31 J**	**0.31 J**	**0.34 J**	< 1.0 U	**13**	**11**	**12**	**12**	**11**	**13**
Trichlorofluoromethane (Freon 11)	5	< 5.0 U	<5.0 U	< 5.0 U	< 5.0 U	< 5.0	< 5.0 U	< 2.0 U	< 2.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 5.0	< 5.0 U
Trichlorotrifluoroethane (Freon 113)	5	< 5.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 5.0	< 5.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 5.0	< 5.0 U
Vinyl Chloride	2	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U	< 1.0	< 1.0 U	< 1.0 U	< 1.0 U	**88**	**99**	**87**	**48**	**74**	**88**
Xylene-o	5	< 5.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 1.0	< 1.0 U	< 1.0 U	< 1.0 U	**3.1 J**	**4.0 J**	**3.2 J**	**2.0 J**	**2.4**	**2.0**
Xylenes - m,p	5	< 5.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 1.0	< 1.0 U	< 1.0 U	< 1.0 U	**6.8**	**6.8**	**5.4**	**3.1 J**	**3.2**	**3.0**
Total VOCs [2]		**1.0**	**0.67**	**0.62**	**0.34**	**0.31**	**0.31**	**0.34**	**0.20**	**302**	**344**	**277**	**169**	**196**	**195**
Project VOCs [3]		**1.0**	**0.67**	**0.62**	**0.34**	**0.31**	**0.31**	**0.34**	**0**	**297**	**338**	**272**	**163**	**190**	**190**

See notes on last page.

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Table 8
Concentrations of Volatile Organic Compounds in Groundwater
Samples Collected from Remedial Wells, Bethpage Park
Groundwater Containment System, Operable Unit 3
(Former Settling Ponds), Bethpage, New York [1]

ARCADIS Design & Consultancy for natural and built assets

Sample Location: / COMPOUND / Sample Date: (ppb)	NYSDEC SCGs	RW-2 5/26/2015	RW-2 8/19/2015	RW-3 11/14/2013	RW-3 2/19/2013	RW-3 5/6/2014	RW-3 10/1/2014	RW-3 11/17/2014	RW-3 2/12/2015	RW-3 5/26/2015	RW-3 8/19/2015	RW-4 11/13/2013	RW-4 2/18/2014	RW-4 5/5/2014	RW-4 10/1/2014
1,1,1-Trichloroethane	5	< 1.0 U	< 1.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 1.0	< 1.0 U	< 1.0 U	< 1.0 U	**0.23 J**	< 5.0 U	< 5.0 U	< 5.0 U
1,1,2,2-Tetrachloroethane	5	< 1.0 U	< 1.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 1.0	< 1.0 U	< 1.0 U	< 1.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 5.0 U
1,1,2-Trichloroethane	1	< 1.0 U	< 1.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 1.0	< 1.0 U	< 1.0 U	< 1.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 5.0 U
1,1-Dichloroethane	5	**1.1**	**0.94 J**	**0.23 J**	< 5.0 U	< 5.0 U	< 5.0 U	< 1.0	< 1.0 U	< 1.0 U	< 1.0 U	**0.38 J**	**0.38 J**	**0.40 J**	**0.36 J**
1,1-Dichloroethene	5	< 1.0 U	< 1.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 1.0	< 1.0 U	< 1.0 U	< 1.0 U	**0.25 J**	**0.23 J**	< 5.0 U	< 5.0 U
1,2-Dichloroethane	0.6	< 1.0 U	< 1.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 1.0	< 1.0 U	< 1.0 U	< 1.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 5.0 U
1,2-Dichloropropane	1	< 1.0 U	< 1.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 1.0	< 1.0 U	< 1.0 U	< 1.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 5.0 U
2-Butanone	NE	< 10 U	< 10 U	< 50 U	< 50 U	< 50 U	< 50 U	< 10	< 10 U	< 10 U	< 10 U	< 50 U	< 50 U	< 50 U	< 50 U
4-methyl-2-pentanone	50	< 5.0 U	< 5.0 U	< 50 U	< 50 U	< 50 U	< 50 U	< 5.0	< 5.0 U	< 5.0 U	< 5.0 U	< 50 U	< 50 U	< 50 U	< 50 U
Acetone	NE	< 10 U	< 10 U	< 50 U	< 50 U	< 50 U	< 50 U	< 10	< 5.0 U	< 10 U	< 10 U	< 50 U	< 50 U	< 50 U	< 50 U
Benzene	1	< 0.50 U	< 0.50 U	< 0.70 U	< 0.70 U	< 0.70 U	< 0.70 U	< 1.0	< 10 U	< 0.50 U	< 0.50 U	< 0.70 U	< 0.70 U	< 0.70 U	< 0.70 U
Bromodichloromethane	50	< 1.0 U	< 1.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 1.0	< 1.0 U	< 1.0 U	< 1.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 5.0 U
Bromoform	50	< 1.0 U	< 1.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 4.0	< 1.0 U	< 1.0 U	< 1.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 5.0 U
Bromomethane	5	< 2.0 U	< 2.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 2.0	< 4.0 U	< 2.0 U	< 2.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 5.0 U
Carbon Disulfide	60	0.30 J	< 2.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 2.0	< 2.0 U	< 2.0 U	< 2.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 5.0 U
Carbon tetrachloride	5	< 1.0 U	< 1.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 1.0	< 2.0 U	< 1.0 U	< 1.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 5.0 U
Chlorobenzene	5	< 1.0 U	< 1.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 1.0	< 1.0 U	< 1.0 U	< 1.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 5.0 U
Chlorodibromomethane	50	< 1.0 U	< 1.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 1.0	< 1.0 U	< 1.0 U	< 1.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 5.0 U
Chlorodifluoromethane (Freon 22)	NE	< 5.0 U	< 5.0 U	**61**	**45**	**34**	**9.0**	**15**	**18.6**	**12.1**	**9.6**	**100**	**82**	**68**	**42**
Chloroethane	5	< 1.0 U	< 1.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 1.0	< 1.0 U	< 1.0 U	< 1.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 5.0 U
Chloroform	7	**2.2**	**3.3**	**2.5 J**	**3.8 J**	**4.9 J**	**4.8 J**	**4.0**	**6.8**	**8.7**	**9.9**	**0.37 J**	**0.39 J**	**0.41 J**	**0.37 J**
Chloromethane	5	< 1.0 U	< 1.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 1.0	< 1.0 U	< 1.0 U	< 1.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 5.0 U
cis-1,2-dichloroethene	5	**39.1**	**30.2**	**6.1**	**4.9 J**	**4.3 J**	**2.8 J**	**2.9**	**3.2**	**2.5**	**1.9**	**0.22 J**	**0.20 J**	**0.24 J**	< 5.0 U
cis-1,3-dichloropropene	0.4	< 1.0 U	< 1.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 1.0	< 1.0 U	< 1.0 U	< 1.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 5.0 U
Dichlorodifluoromethane (Freon 12)	5	< 2.0 U	< 2.0 U	**0.33 J**	< 5.0 U	< 5.0 U	< 5.0 U	< 5.0	< 1.0 U	< 2.0 U	< 2.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 5.0 U
Dichloromethane	5	< 2.0 U	< 2.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 2.0	< 5.0 U	< 2.0 U	< 2.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 5.0 U
Ethylbenzene	5	**2.1**	**1.4**	< 5.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 1.0	< 1.0 U	< 1.0 U	< 1.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 5.0 U
Methyl N-Butyl Ketone	50	< 5.0 U	< 5.0 U	< 50 U	< 50 U	< 50 U	< 50 U	< 5.0	< 1.0 U	< 5.0 U	< 5.0 U	< 50 U	< 50 U	< 50 U	< 50 U
Methyl tert-Butyl Ether	5	< 1.0 U	< 1.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 1.0	< 2.0 U	< 1.0 U	< 1.0 U	**0.24 J**	**0.24 J**	**0.30 J**	< 5.0 U
Styrene	5	< 1.0 U	< 1.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 5.0	< 5.0 U	< 1.0 U	< 1.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 5.0 U
Tetrachloroethene	5	< 1.0 U	< 1.0 U	**0.28 J**	**0.30 J**	**0.36 J**	< 5.0 U	< 1.0	< 1.0 U	< 1.0 U	< 1.0 U	**1.1 J**	**0.79 J**	**0.82 J**	**0.74 J**
Toluene	5	**16**	**9.5**	**0.31 J**	< 5.0 U	< 5.0 U	**0.35 J**	< 1.0	< 1.0 U	< 1.0 U	< 1.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 5.0 U
trans-1,2-dichloroethene	5	< 1.0 U	< 1.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 1.0	< 1.0 U	< 1.0 U	< 1.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 5.0 U
trans-1,3-dichloropropene	0.4	< 1.0 U	< 1.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 1.0	< 1.0 U	< 1.0 U	< 1.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 5.0 U
Trichloroethylene	5	**12.8**	**10.1**	**3.9 J**	**3.6 J**	**3.6 J**	**2.6 J**	**3.4**	**3.5**	**2.9**	**2.2**	**0.76 J**	**0.67 J**	**0.79 J**	**0.61 J**
Trichlorofluoromethane (Freon 11)	5	< 2.0 U	< 2.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 5.0	< 5.0 U	< 2.0 U	< 2.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 5.0 U
Trichlorotrifluoroethane (Freon 113)	5	< 5.0 U	< 5.0 U	< 5.0 U	**0.34 J**	< 5.0 U	< 5.0 U	< 5.0	< 5.0 U	< 5.0 U	< 5.0 U	**0.29 J**	< 5.0 U	< 5.0 U	< 5.0 U
Vinyl Chloride	2	**63**	**36.6**	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U	< 1.0	< 1.0 U	< 1.0 U	< 1.0 U	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U
Xylene-o	5	**1.2**	**0.52 J**	< 5.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 1.0	< 1.0 U	< 1.0 U	< 1.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 5.0 U
Xylenes - m,p	5	**2.1**	**0.97 J**	< 5.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 1.0	< 1.0 U	< 1.0 U	< 1.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 5.0 U
Total VOCs [2]		**140**	**93.5**	**75**	**58**	**47**	**19.6**	**25**	**32**	**26**	**23.6**	**104**	**85**	**71**	**44**
Project VOCs [3]		**135**	**88.8**	**11**	**8.8**	**8.3**	**5.8**	**6.3**	**6.7**	**5.4**	**4.1**	**2.9**	**2.3**	**2.3**	**1.7**

See notes on last page.

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Table 9
Concentrations of Volatile Organic Compounds in Groundwater
Samples Collected from Remedial Wells, Bethpage Park
Groundwater Containment System, Operable Unit 3
(Former Settling Ponds), Bethpage, New York [1]

ARCADIS Design & Consultancy for natural and built assets

COMPOUND (ppb)	Sample Location: Sample Date:	RW-4 11/17/2014	RW-4 2/12/2015	RW-4 5/26/2015	RW-4 8/19/2015
	NYSDEC SCGs				
1,1,1-Trichloroethane	5	< 1.0	< 1.0 U	< 1.0 U	< 1.0 U
1,1,2,2-Tetrachloroethane	5	< 1.0	< 1.0 U	< 1.0 U	< 1.0 U
1,1,2-Trichloroethane	1	< 1.0	< 1.0 U	< 1.0 U	< 1.0 U
1,1-Dichloroethane	5	< 1.0	0.42 J	**0.37 J**	**0.36 J**
1,1-Dichloroethene	5	< 1.0	< 1.0 U	< 1.0 U	< 1.0 U
1,2-Dichloroethane	0.6	< 1.0	< 1.0 U	< 1.0 U	< 1.0 U
1,2-Dichloropropane	1	< 1.0	< 1.0 U	< 1.0 U	< 1.0 U
2-Butanone	NE	< 10	< 10 U	< 10 U	< 10 U
4-methyl-2-pentanone	50	< 5.0	< 5.0 U	< 5.0 U	< 5.0 U
Acetone	NE	< 10	< 5.0 U	< 10 U	< 10 U
Benzene	1	< 1.0	< 10 U	< 0.50 U	< 0.50 U
Bromodichloromethane	50	< 1.0	< 1.0 U	< 1.0 U	< 1.0 U
Bromoform	50	< 4.0	< 1.0 U	< 1.0 U	< 1.0 U
Bromomethane	5	< 2.0	< 4.0 U	< 2.0 U	< 2.0 U
Carbon Disulfide	60	< 2.0	< 2.0 U	< 2.0 U	< 2.0 U
Carbon tetrachloride	5	< 1.0	< 2.0 U	< 1.0 U	< 1.0 U
Chlorobenzene	5	< 1.0	< 1.0 U	< 1.0 U	< 1.0 U
Chlorodibromomethane	50	< 1.0	< 1.0 U	< 1.0 U	< 1.0 U
Chlorodifluoromethane (Freon 22)	NE	**49**	**50.1**	**32.8**	**29.7**
Chloroethane	5	< 1.0	< 1.0 U	< 1.0 U	< 1.0 U
Chloroform	7	**0.30 J**	**0.36 J**	**0.33 J**	**0.38 J**
Chloromethane	5	< 1.0	< 1.0 U	< 1.0 U	< 1.0 U
cis-1,2-dichloroethene	5	< 1.0	< 1.0 U	< 1.0 U	< 1.0 U
cis-1,3-dichloropropene	0.4	< 1.0	< 1.0 U	< 1.0 U	< 1.0 U
Dichlorodifluoromethane (Freon 12)	5	< 5.0	< 1.0 U	< 2.0 U	< 2.0 U
Dichloromethane	5	< 2.0	< 5.0 U	< 2.0 U	< 2.0 U
Ethylbenzene	5	< 1.0	< 1.0 U	< 1.0 U	< 1.0 U
Methyl N-Butyl Ketone	50	< 5.0	**0.29 J**	< 5.0 U	< 5.0 U
Methyl tert-Butyl Ether	5	**0.30 J**	< 2.0 U	**0.29 J**	< 1.0 U
Styrene	5	< 5.0	< 5.0 U	< 1.0 U	< 1.0 U
Tetrachloroethene	5	**0.70 J**	**0.82 J**	**0.84 J**	**0.61 J**
Toluene	5	< 1.0	< 1.0 U	< 1.0 U	< 1.0 U
trans-1,2-dichloroethene	5	< 1.0	< 1.0 U	< 1.0 U	< 1.0 U
trans-1,3-dichloropropene	0.4	< 1.0	< 1.0 U	< 1.0 U	< 1.0 U
Trichloroethylene	5	**0.66 J**	**0.72 J**	**0.67 J**	**0.54 J**
Trichlorofluoromethane (Freon 11)	5	< 5.0	< 5.0 U	< 2.0 U	< 2.0 U
Trichlorotrifluoroethane (Freon 113)	5	< 5.0	< 5.0 U	< 5.0 U	< 5.0 U
Vinyl Chloride	2	< 1.0	< 1.0 U	< 1.0 U	< 1.0 U
Xylene-o	5	< 1.0	< 1.0 U	< 1.0 U	< 1.0 U
Xylenes - m,p	5	< 1.0	< 1.0 U	< 1.0 U	< 1.0 U
Total VOCs [2]		**51**	**53**	**48**	**31.6**
Project VOCs [3]		**1.4**	**2.0**	**1.8**	**1.5**

See notes on last page.

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Notes:

(1) Water samples collected by ARCADIS on the dates shown and submitted to a NYSDOH ELAP certified laboratory for VOC analyses per NYSDEC ASP 2005, Method OLM 4.3 (prior to September 1, 2014) and per USEPA Method 8260C (after September 1, 2014). Results validated following protocols specified in Sampling and Analysis Plan in the December 2009 DRAFT OM&M Manual (ARCADIS 2009). See previous quarterly reports for historical analytical results.

(2) "Total VOCs" represents the sum of individual concentrations of the VOCs detected.

(3) "Project VOCs" represents the sum of individual compound concentrations of 1,1,1-trichloroethane; 1,1-dichloroethane; 1,2-dichloroethane; 1,1-dichloroethene; tetrachloroethene; trichloroethene; vinyl chloride; cis-1,2-dichloroethene; trans-1,2-dichloroethene; benzene; toluene; and xylenes-o,m, and p.

Acronyms\Key:

Indicates an exceedance of an SCG.

Bold value indicates a detection.

ASP	Analytical services protocol.
ELAP	Environmental Laboratory Approval Program
NYSDEC	New York State Department of Environmental Conservation.
NYSDOH	New York State Department of Health
SCGs	Standards, criteria, and guidance values.
VOC	Volatile organic compound.
µg/L	Micrograms per liter.
--	Not analyzed.
NE	Not established.
D	Compound identified from secondary dilution.
J	Compound detected but below its reporting limit; the value is estimated.
< 5; <5 U	Compound not detected above its laboratory quantification limit.

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Table 10
Concentrations of Metals in Groundwater Samples Collected from Remedial Wells
Bethpage Park Groundwater Containment System, Operable Unit 3
(Former Grumman Settling Ponds), Bethpage, New York

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COMPOUND (µg/L) / Sample Location / Sample Date	NYSDEC SCGs	RW-1[2] 10/1/2012	RW-1 1/7/2013	RW-1 4/1/2013	RW-1 7/1/2013	RW-1 11/14/2013	RW-1 2/18/2014	RW-1 5/5/2014	RW-1 10/1/2014	RW-1 11/17/2014	RW-1 2/12/2015	RW-1 5/26/2015	RW-1 8/19/2015	RW-2 4/1/2013
Total Cadmium	5	< 5	--	--	--	< 5.0	--	--	--	< 3.0	--	--	--	--
Dissolved Cadmium	5	< 5	--	--	--	< 5.0	--	--	--	< 3.0	--	--	--	--
Total Chromium	50	**23**	--	--	--	**28**	--	--	--	**30**	--	--	--	--
Dissolved Chromium	50	**23**	--	--	--	**32**	--	--	--	**32**	--	--	--	--
Total Iron	300	< 100	--	--	--	< 100	--	--	--	< 100	--	--	--	**1,070**
Dissolved Iron	300	< 100	--	--	--	< 100	--	--	--	< 100	--	--	--	**720**
Total Manganese	300	--	--	--	--	--	--	--	--	--	--	--	--	--
Dissolved Manganese	300	--	--	--	--	--	--	--	--	--	--	--	--	--
Total Mercury	0.7	--	--	--	--	< 0.20	--	--	--	--	--	--	--	--
Dissolved Mercury	0.7	--	--	--	--	--	--	--	--	--	--	--	--	--

See notes on last page.

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Table 10
Concentrations of Metals in Groundwater Samples Collected from Remedial Wells
Bethpage Park Groundwater Containment System, Operable Unit 3
(Former Grumman Settling Ponds), Bethpage, New York

ARCADIS Design & Consultancy for natural and built assets

COMPOUND (ug/L) / Sample Location / Sample Date	NYSDEC SCGs	RW-2 5/6/2013	RW-2 6/6/2013	RW-2 7/1/2013	RW-2 11/14/2013	RW-2 2/18/2014	RW-2 5/5/2014	RW-2 10/1/2014	RW-2 11/17/2014	RW-2 2/12/2015	RW-2 5/28/2015	RW-2 8/19/2015	RW-3 4/1/2013	RW-3 5/6/2013
Total Cadmium	5	--	--	--	< 5.0	--	--	--	< 3.0	--	--	--	--	--
Dissolved Cadmium	5	--	--	--	< 5.0	--	--	--	< 3.0	--	--	--	--	--
Total Chromium	50	--	--	--	< 10	--	--	--	< 10	--	--	--	--	--
Dissolved Chromium	50	--	--	--	< 10	--	--	--	< 10	--	--	--	--	--
Total Iron	300	**700**	**990**	**1,200**	**1,540**	**890**	**660**	**2,060**	**1,160**	--	--	--	**230**	**330**
Dissolved Iron	300	**600**	**740**	**650**	**850**	**680**	**760**	**1,200**	**1,100**	--	--	--	**110**	< 100
Total Manganese	300	--	--	--	--	--	--	--	--	--	--	--	--	--
Dissolved Manganese	300	--	--	--	--	--	--	--	--	--	--	--	--	--
Total Mercury	0.7	--	--	--	< 0.20	--	--	--	--	--	--	--	--	--
Dissolved Mercury	0.7	--	--	--	--	--	--	--	--	--	--	--	--	--

See notes on last page.

ED_002631A_00010847-00041

Table 10
Concentrations of Metals in Groundwater Samples Collected from Remedial Wells
Bethpage Park Groundwater Containment System, Operable Unit 3
(Former Grumman Settling Ponds), Bethpage, New York

ARCADIS Design & Consultancy for natural and built assets

COMPOUND (µg/L) / Sample Location / Sample Date	NYSDEC SCGs	RW-3 6/6/2013	RW-3 7/1/2013	RW-3 11/14/2013	RW-3 2/19/2014	RW-3 5/5/2014	RW-3 10/1/2014	RW-3 11/17/2014	RW-3 2/12/2015	RW-3 5/26/2015	RW-3 8/19/2015	RW-4 11/11/2011	RW-4[2] 10/1/2012	RW-4 1/7/2013
Total Cadmium	5	--	--	< 5.0	--	--	--	< 3.0	--	--	--	< 5	< 5	--
Dissolved Cadmium	5	--	--	< 5.0	--	--	--	< 3.0	--	--	--	< 5	< 5	--
Total Chromium	50	--	--	< 10	--	--	--	< 10	--	--	--	< 10	< 10	--
Dissolved Chromium	50	--	--	< 10	--	--	--	< 10	--	--	--	< 10	< 10	--
Total Iron	300	**280**	**180**	**280**	**170**	**190**	**350**	< 100	--	--	--	< 100	< 100	--
Dissolved Iron	300	**140**	<100	**150**	<100	<100	<100	< 100	--	--	--	< 100	< 100	--
Total Manganese	300	--	--	--	--	--	--	--	--	--	--	--	--	--
Dissolved Manganese	300	--	--	--	--	--	--	--	--	--	--	--	--	--
Total Mercury	0.7	--	--	< 0.20	--	--	--	--	--	--	--	--	--	--
Dissolved Mercury	0.7	--	--	--	--	--	--	--	--	--	--	--	--	--

See notes on last page.

ED_002631A_00010847-00042

Table 10
Concentrations of Metals in Groundwater Samples Collected from Remedial Wells
Bethpage Park Groundwater Containment System, Operable Unit 3
(Former Grumman Settling Ponds), Bethpage, New York

ARCADIS Design & Consultancy for natural and built assets

COMPOUND (ug/L) / Sample Location Sample Date	NYSDEC SCGs	RW-4 4/1/2013	RW-4 7/1/2013	RW-4 11/14/2013	RW-4 2/18/2014	RW-4 5/5/2014	RW-4 10/1/2014	RW-4 11/17/2014	RW-4 2/12/2015	RW-4 5/26/2015	RW-4 8/19/2015
Total Cadmium	5	--	--	< 5.0	--	--	--	< 3.0	--	--	--
Dissolved Cadmium	5	--	--	< 5.0	--	--	--	< 3.0	--	--	--
Total Chromium	50	--	--	< 10	--	--	--	< 10	--	--	--
Dissolved Chromium	50	--	--	< 10	--	--	--	< 10	--	--	--
Total Iron	300	--	--	< 100	--	--	--	< 100	--	--	--
Dissolved Iron	300	--	--	< 100	--	--	--	< 100	--	--	--
Total Manganese	300	--	--	--	--	--	--	--	--	--	--
Dissolved Manganese	300	--	--	--	--	--	--	--	--	--	--
Total Mercury	0.7	--	--	< 0.20	--	--	--	--	--	--	--
Dissolved Mercury	0.7	--	--	--	--	--	--	--	--	--	--

See notes on last page.

ED_002631A_00010847-00043

Notes:

(1) Water samples collected by Arcadis on the dates shown and submitted to a New York State Department of Health (NYSDOH) Environmental Laboratory Approval Program (ELAP) certified laboratory for metals analysis using USEPA Method 6010 and for mercury analyses using USEPA Method 7470. Results validated following protocols specified in Sampling and Analysis Plan in the December 2009 DRAFT OM&M Manual (ARCADIS 2009).

(2) Beginning January 2012 metals analyses for recovery wells RW-1 and RW-4 are included with annual recovery well sampling performed in the fourth quarter of each year.

Acronyms/Key:

	Indicates an exceedance of an SCG.
700	Bold data indicates that the analyte was detected at or above its reporting limit.
ASP	Analytical services protocol.
ELAP	Environmental Laboratory Approval Program
NYSDEC	New York State Department of Environmental Conservation.
NYSDOH	New York State Department of Health
USEPA	U.S. Environmental Protection Agency
SCGs	Standards, criteria, and guidance values.
µg/L	Micrograms per liter.
--	Not analyzed.
< 5	Compound not detected above its laboratory quantification limit.

ED_002631A_00010847-00044

Table 11
Summary of Water-Level Elevations, Bethpage Park
Groundwater Containment System, Operable Unit 3
(Former Grumman Settling Ponds), Bethpage, New York

ARCADIS Design & Consultancy for natural and built assets

Well Identification	Well Casing Elevation (ft msl)	Event Date	Baseline (1) 5/8/2009 (ft msl)	1Q2010 02/04/10 (ft msl)	2Q2010 04/23/10 (ft msl)	3Q2010 08/26/10 (ft msl)	4Q2010 12/10/10 (ft msl)	1Q2011 02/04/11 (ft msl)	2Q2011 05/20/11 (ft msl)	3Q2011 08/09/11 (ft msl)	4Q2011 10/26/11 (ft msl)	1Q2012 01/25/12 (ft msl)	2Q2012 05/02/12 (ft msl)	3Q2012 08/17/12 (ft msl)	4Q2012 10/05/12 (ft msl)	1Q2013 02/13/13 (ft msl)	2Q2013 05/15/13 (ft msl)
Recovery Wells																	
RW-1	125.18		69.75	70.67	74.38	72.52	71.11	70.96	72.13	70.44	72.72	73.15	72.12	71.71	71.21	70.35	70.89
RW-2	124.48		72.27	61.80	64.88	63.44	61.35	67.99	66.31	64.18	65.11	69.05	69.81	65.3	63.7	62.66	63.33
RW-3	122.84		69.40	67.64	71.4	69.44*	68.13	67.74	68.88	67.64	69.70	70.75	71.74	74.35(2)	68.06	68.01	68.73
RW-4	121.24		69.25	70.34	74.01	71.92	70.55	67.05	71.36	69.94	72.12	72.7	71.6	70.88	70.66	69.69	70.36
Monitoring Wells																	
B24MW-2	126.96		74.31	74.13	76.16	75.86	75.65	74.96	76.06	74.35	76.00	76.28	75.57	75.76	74.63	74.85	74.32
B24MW-3	127.11		72.63	72.16	75.87	74.10	72.89	72.40	74.04	72.27	74.44	74.63	73.67	73.62	72.69	72.2	72.41
B30MW-1	128.33		73.55	73.00	76.54	74.96	73.86	73.38	74.75	73.25	75.41	75.54	74.66	NM	73.66	73.11	73.28
BCPMW-1	125.73		73.16	72.67	76.26	74.66	73.43	72.94	74.75	72.94	75.05	75.23	74.29	74.22	73.27	NM	73.09
BCPMW-2	126.39		72.55	71.83	75.52	73.69	72.55	72.03	73.64	71.94	74.16	74.33	73.29	73.17	72.39	71.82	72.09
BCPMW-3	124.94		72.46	71.59	75.24	73.40	72.27	71.74	73.25	71.64	73.94	74.05	73.06	72.85	72.14	71.56	71.79
BCPMW-4-1	128.71		72.30	71.28	75	73.08	71.97	71.51	73.03	71.41	73.65	73.73	72.76	72.54	71.84	71.36	71.51
BCPMW-4-2	129.33		72.58	71.54	75.25	73.34	72.26	71.74	73.24	71.69	73.92	74.01	73.01	72.79	72.1	71.6	71.76
BCPMW-4-3	129.2		72.32	71.47	75.17	73.27	72.15	71.74	73.20	71.56	73.85	73.97	72.95	72.72	71.98	71.54	71.68
BCPMW-5-1	129.37		72.79	72.14	75.66	73.94	72.72	72.74	73.81	72.14	74.46	74.77	73.67	73.34	72.62	72.06	72.19
BCPMW-6-1	126.01		72.12	71.26	74.91	72.96	71.91	71.49	72.77	71.45	73.58	73.67	72.66	72.32	71.73	71.12	71.32
BCPMW-6-2	125.16		71.74	70.96	74.64	72.60	71.59	71.17	72.49	71.01	73.26	73.37	72.30	71.97	71.39	70.84	71.01
BCPMW-7-1	124.81		72.00	71.33	74.99	72.99	71.97	71.51	72.78	71.53	73.62	73.71	72.71	72.31	71.77	71.2	71.33
MW-200-1	123.49		72.16	71.37	75.07	73.14	72.08	71.72	72.98	71.52	73.69	73.83	72.76	72.59	71.91	71.34	71.53
MW-201-1	121.69		72.04	71.10	74.84	72.87	71.79	71.33	72.69	71.25	73.48	73.55	72.53	72.28	71.65	71.09	71.28
MW-202-1	119.27		71.90	71.13	74.83	72.82	71.77	71.32	72.66	71.21	73.46	73.57	73.51	72.23	71.6	70.98	71.23
MW-203-1	118.25		71.83	71.10	74.75	72.77	71.75	71.30	72.61	70.20	73.43	73.52	72.49	72.13	71.56	71.02	71.17
Piezometers																	
PZ-1a	128.82		72.56	71.15	74.87	72.94	71.85	71.33	72.76	71.31	73.54	73.62	72.63	72.42	71.72	71.23	71.39
PZ-1b	128.92		72.47	71.09	74.78	72.88	71.82	71.28	72.70	71.24	73.47	73.55	72.56	72.36	71.64	71.16	71.35
PZ-1c	128.96		72.47	71.48	75.15	73.23	72.13	71.74	73.16	71.56	73.83	73.9	72.90	72.68	71.94	71.46	71.63
PZ-2a	128.36		72.47	71.09	74.82	72.87	71.81	71.34	72.74	71.30	73.45	73.57	72.57	72.32	71.64	71.14	71.32
PZ-2b	128.37		72.43	71.08	74.77	72.86	71.78	71.30	72.68	71.27	73.45	73.55	72.54	72.28	71.61	71.13	71.29
PZ-2c	128.55		72.41	71.40	75.05	73.15	72.05	71.68	73.05	71.52	73.74	73.87	72.82	72.55	71.88	71.38	71.55
PZ-3	124.99		72.52	70.94	74.69	72.71	71.65	70.93	72.55	71.08	73.28	73.4	72.35	72.16	71.44	71.06	71.18
PZ-4	125.31		72.50	71.07	74.81	72.83	71.78	71.45	72.64	71.32	73.42	73.52	72.54	72.32	71.63	71.18	71.33
PZ-5a	129.07		72.50	71.94	75.61	73.79	72.59	72.17	73.70	71.98	74.27	74.39	73.40	73.25	72.45	71.94	72.16
PZ-5b	129.06		72.50	71.84	75.53	73.69	72.51	72.08	73.67	71.88	74.16	74.29	73.29	73.15	72.35	71.85	72.08
PZ-6a	125.67		72.50	71.03	74.73	72.84	71.70	71.24	72.56	71.24	73.37	73.46	72.43	72.13	71.5	70.95	71.17
PZ-6b	125.74		72.50	70.93	74.7	72.65	71.58	71.11	72.46	71.14	73.28	73.37	72.34	72.05	71.43	70.88	71.11
PZ-7a	125.10		72.50	71.32	75.02	73.00	72.00	71.54	72.80	71.58	73.67	73.7	72.72	72.36	71.78	71.2	71.35
PZ-7b	125.06		72.50	71.21	74.85	72.83	71.83	71.37	72.68	71.26	73.45	73.53	72.51	72.13	71.54	71.05	71.16

Notes:
(1) Baseline readings were taken prior to system startup, which occurred on July 21, 2009.
(2) Measurement collected is believed to be anomalous.
(3) Well casing is broken and blockage exists at around 2 feet below top of casing.
*: RW-3 water level measurement collected on September 9, 2010.

Acronyms/Key:
ft msl feet relative to mean sea level
NM not measured

ED_002631A_00010847-00045

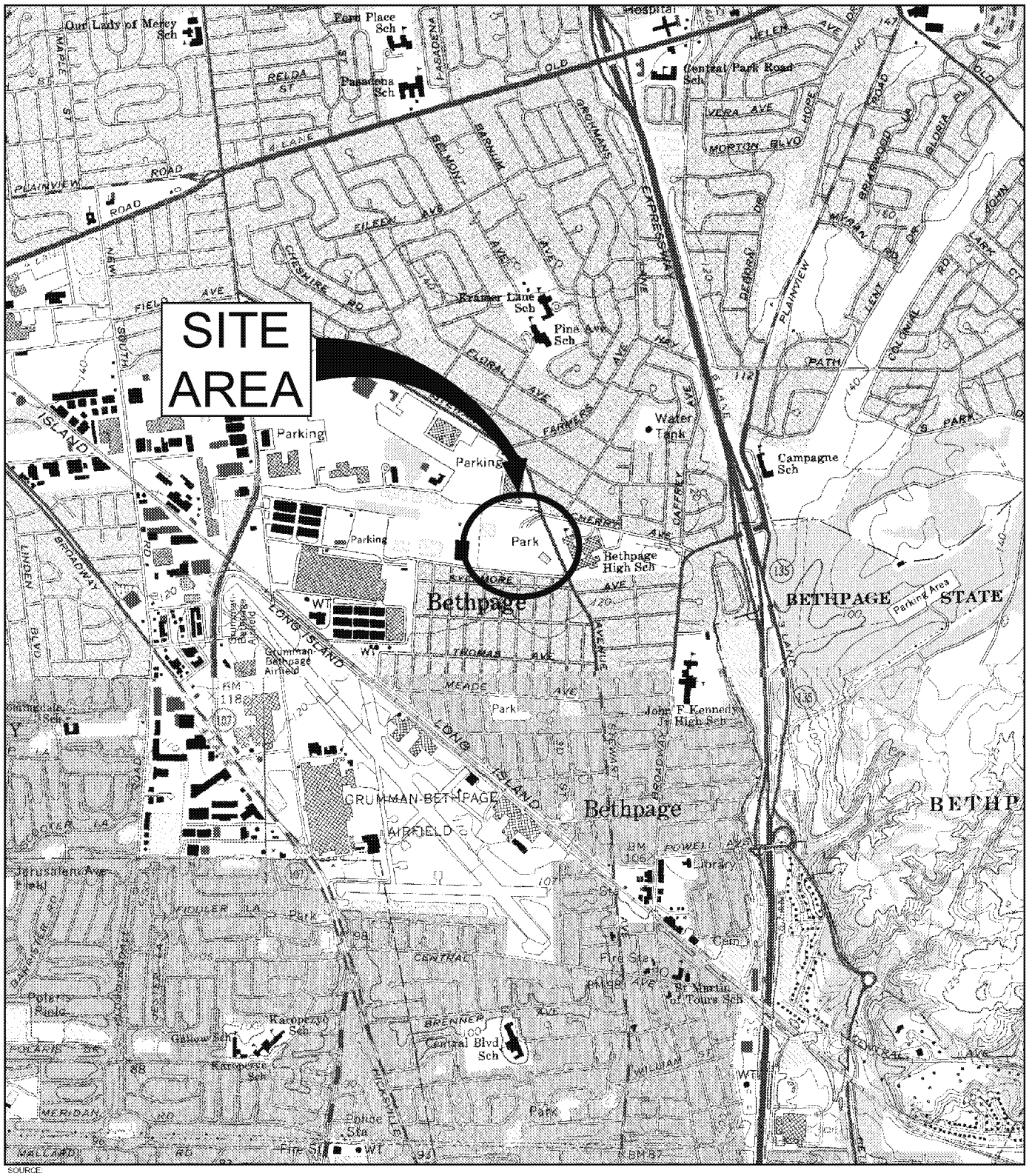
Table 11
Summary of Water-Level Elevations, Bethpage Park
Groundwater Containment System, Operable Unit 3
(Former Grumman Settling Ponds), Bethpage, New York

Well Identification	Well Casing Elevation (ft msl)	Event Date	Baseline (1) 5/8/2009 (ft msl)	3Q2013 08/13/13 (ft msl)	4Q2013 11/01/13 (ft msl)	1Q2014 03/07/14 (ft msl)	2Q2014 06/03/14 (ft msl)	3Q2014 08/15/14 (ft msl)	4Q2014 12/23/2014 (ft. msl)	1Q2015 3/19/2015 (ft. msl)	2Q2015 5/28/2015 (ft. msl)	3Q2015 9/20/2015 (ft. msl)
Recovery Wells												
RW-1	125.18		69.75	71.62	69.31	68.08	69.97	69.83	69.40	70.16	70.53	68.69
RW-2	124.48		72.27	61.35	60.23	58.2	64.45	64.22	61.63	62.27	62.16	61.15
RW-3	122.84		69.40	72.29	67.11	64.49	66.97	67.09	66.11	67.08	67.43	NM
RW-4	121.24		69.25	71.19	68.69	67.37	69.39	68.80	68.63	69.39	69.76	68.02
Monitoring Wells												
B24MW-2	126.96		74.31	73.81	72.88	72.65	73.48	73.93	73.49	74.20	73.80	72.63
B24MW-3	127.11		72.63	73.14	68.24	69.82	71.67	71.77	71.17	NM	NM	NM
B30MW-1	128.33		73.55	73.97	72.26	70.73	72.61	72.21	72.02	72.79	72.92	71.45
BCPMW-1	125.73		73.16	73.51	71.66	70.27	72.86	72.40	71.77	72.58	72.56	70.77
BCPMW-2	126.39		72.55	72.66	70.77	69.51	71.41	71.19	70.85	71.59	71.67	71.31
BCPMW-3	124.94		72.46	72.44	70.57	69.25	71.12	70.78	70.65	71.34	71.48	68.68
BCPMW-4-1	128.71		72.30	72.27	70.25	68.96	70.91	70.50	70.30	70.80	71.24	69.59
BCPMW-4-2	129.33		72.58	72.49	70.5	69.21	71.16	70.78	70.51	71.28	71.46	69.84
BCPMW-4-3	129.2		72.32	72.44	70.41	69.17	71.07	70.75	70.47	71.23	71.40	69.78
BCPMW-5-1	129.37		72.79	72.87	71.01	69.78	71.56	71.22	70.94	71.79	71.93	70.36
BCPMW-6-1	126.01		72.12	72.15	70.15	68.79	70.85	70.21	70.07	70.82	71.15	69.99
BCPMW-6-2	125.16		71.74	71.84	69.83	68.49	70.48	69.94	69.80	70.55	70.82	69.12
BCPMW-7-1	124.81		72.00	72.26	70.21	68.82	70.86	70.19	70.01	70.86	71.28	69.53
MW-200-1	123.49		72.16	72.31	70.37	69.06	71.03	70.55	70.29	71.08	71.32	69.71
MW-201-1	121.69		72.04	72.05	70.08	68.75	70.75	70.07	69.98	70.79	70.75	69.39
MW-202-1	119.27		71.90	--	70.06	68.75	70.70	70.13	69.97	70.83	71.10	69.43
MW-203-1	118.25		71.83	72.01	70.01	68.7	70.64	70.03	69.84	70.69	71.07	69.34
Piezometers												
PZ-1a	128.82		72.56	NM(3)	NM(3)	NM(3)	NM(3)	NM(3)	NM(3)	NM(3)	NM(3)	NM(3)
PZ-1b	128.92		72.47	72.06	70.34	68.77	70.69	70.27	70.41	70.82	71.07	69.37
PZ-1c	128.96		72.47	72.39	70.39	69.12	71.01	70.67	70.46	71.16	71.38	69.70
PZ-2a	128.36		72.47	72.06	70.08	68.73	70.74	70.23	70.03	70.78	71.08	69.96
PZ-2b	128.37		72.43	72.05	70.08	68.71	70.74	70.23	70.03	70.74	71.02	69.92
PZ-2c	128.55		72.41	72.34	70.33	69.02	70.93	70.58	70.31	71.04	71.28	70.01
PZ-3	124.99		72.52	71.92	69.95	68.61	70.60	70.07	70.86	70.72	70.92	73.18
PZ-4	125.31		72.50	72.05	70.09	68.76	70.70	70.25	70.01	NM(3)	71.07	72.95
PZ-5a	129.07		72.50	72.84	70.85	69.62	71.47	71.34	70.95	71.67	71.84	70.10
PZ-5b	129.06		72.50	72.73	70.72	69.51	71.35	71.31	70.86	71.60	71.73	70.00
PZ-6a	125.67		72.50	71.91	69.94	68.53	70.63	69.99	69.83	70.59	70.96	72.51
PZ-6b	125.74		72.50	71.81	69.86	68.44	70.52	69.93	69.74	70.53	70.84	72.36
PZ-7a	125.10		72.50	72.26	70.26	68.84	70.90	70.19	70.02	70.89	NM(3)	NM(3)
PZ-7b	125.06		72.50	71.54	70.07	68.68	70.64	70.06	69.94	70.72	71.06	73.22

Notes:
(1) Baseline readings were taken prior to system startup, which occurred on July 21, 2009.
(2) Measurement collected is believed to be anomalous.
(3) Well casing is broken and blockage exists at around 2 feet below top of casing.
*: RW-3 water level measurement collected on September 9, 2010.

Acronyms/Key:
ft msl feet relative to mean sea level
NM not measured

FIGURES



SOURCE:
USGS 7.5 MIN. AMITYVILLE QUADRANGLE, AMITYVILLE, N.Y., 1994, FREEPORT QUADRANGLE, FREEPORT, N.Y., 1994,
HICKSVILLE QUADRANGLE, HICKSVILLE, N.Y., 1967, PHOTOREVISED 1979, HUNTINGTON, N.Y., 1967, PHOTOREVISED 1979

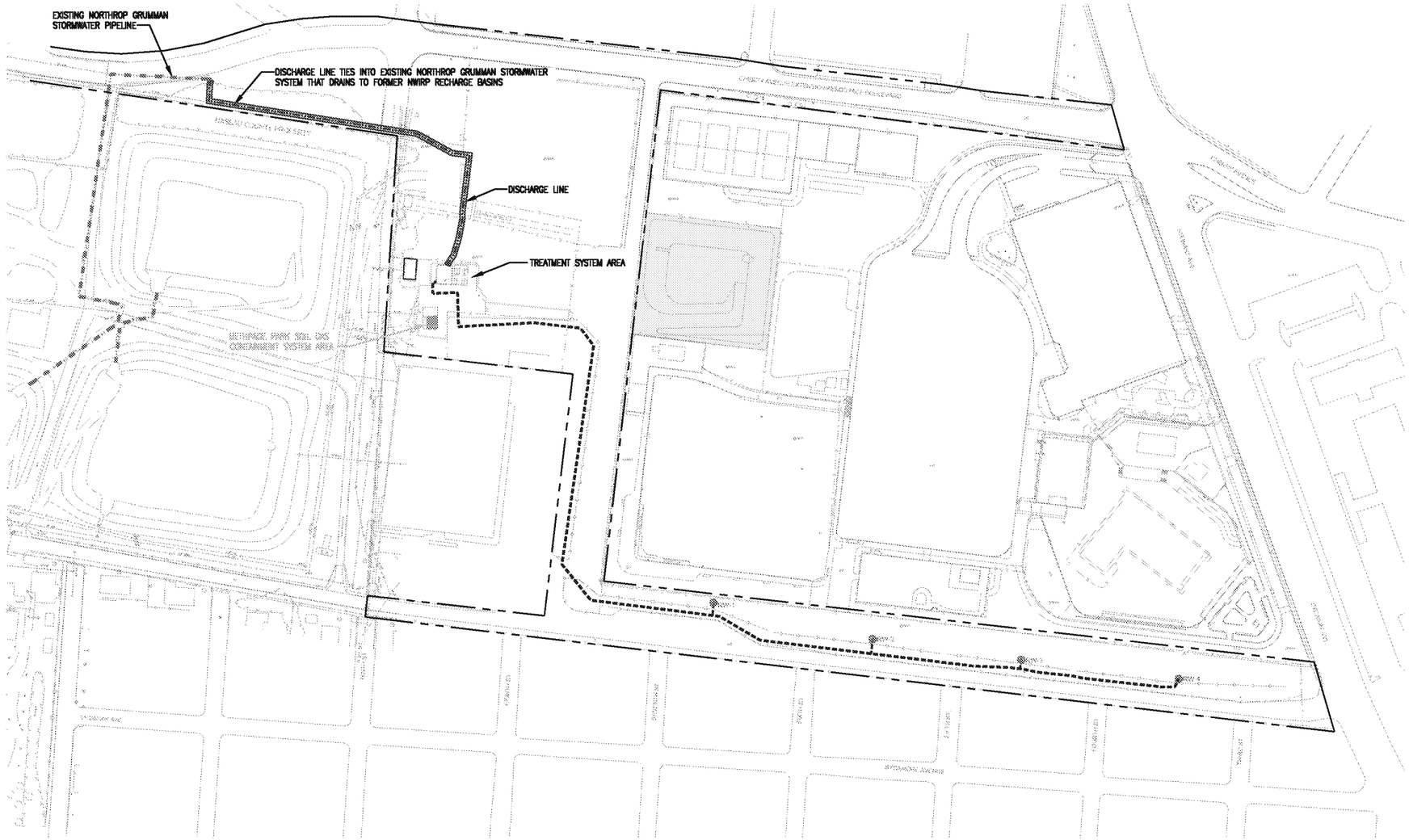
BETHPAGE PARK GROUNDWATER CONTAINMENT SYSTEM
OPERABLE UNIT 3
(FORMER GRUMMAN SETTLING PONDS)
BETHPAGE, NEW YORK

SITE LOCATION

ARCADIS Design & Consultancy for natural and built assets

FIGURE
1

CITY:SYRACUSE-NY DIV/GROUP:ENV DB:A.SANCHEZ LD: PIC:(Opt) PM:(Reqd) TM:(Opt) LYR:(Opt)ON=*;OFF=*REF*
G:\ENVCAD\SYRACUSE\ACT\NY0014986\114\NOMM4\NY14986_301.dwg LAYOUT: BETHPAGE PARK SAVED: 11/11/2015 4:51 PM ACADVER: 19.1S (LMS TECH) PAGESETUP: ---- PLOTSTYLETABLE: ---- PLOTTED: 11/11/2015 4:54 PM BY: STOWELL, GARY
XREFS: IMAGES: PROJECTNAME: ----
AMITYVILLE.TIF
FREEPORT.TIF
HICKSVILLE.TIF
HUNTINGTON.TIF



LEGEND:

- NORTHROP GRUMMAN PROPERTY LINE
- FENCE
- BITUMINOUS PAVEMENT
- INFLUENT PIPELINE AND ELECTRICAL CONDUITS
- EFFLUENT PIPELINE
- EXISTING NORTHROP GRUMMAN STORMWATER PIPELINE
- REMEDIAL WELL
- NWIRP — NAVAL WEAPONS INDUSTRIAL RESERVE PLANT (NOW OWNED BY NASSAU COUNTY)

0 200' 400'

SCALE IN FEET

BETHPAGE PARK GROUNDWATER CONTAINMENT SYSTEM
OPERABLE UNIT 3
(FORMER GRUMMAN SETTLING PONDS)
BETHPAGE, NEW YORK

SITE AND GROUNDWATER CONTAINMENT SYSTEM

ARCADIS Design & Consultancy for natural and built assets

FIGURE 2

CITY:SYRACUSE-NY DIV/GROUP:ENV DB:A.SANCHEZ LD:AS PIC:(Opt) PW:(Reqd) TM:(Opt) LYR:(Opt)ON=*;OFF=*REF*
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XREFS: IMAGES: PROJECTNAME: ----
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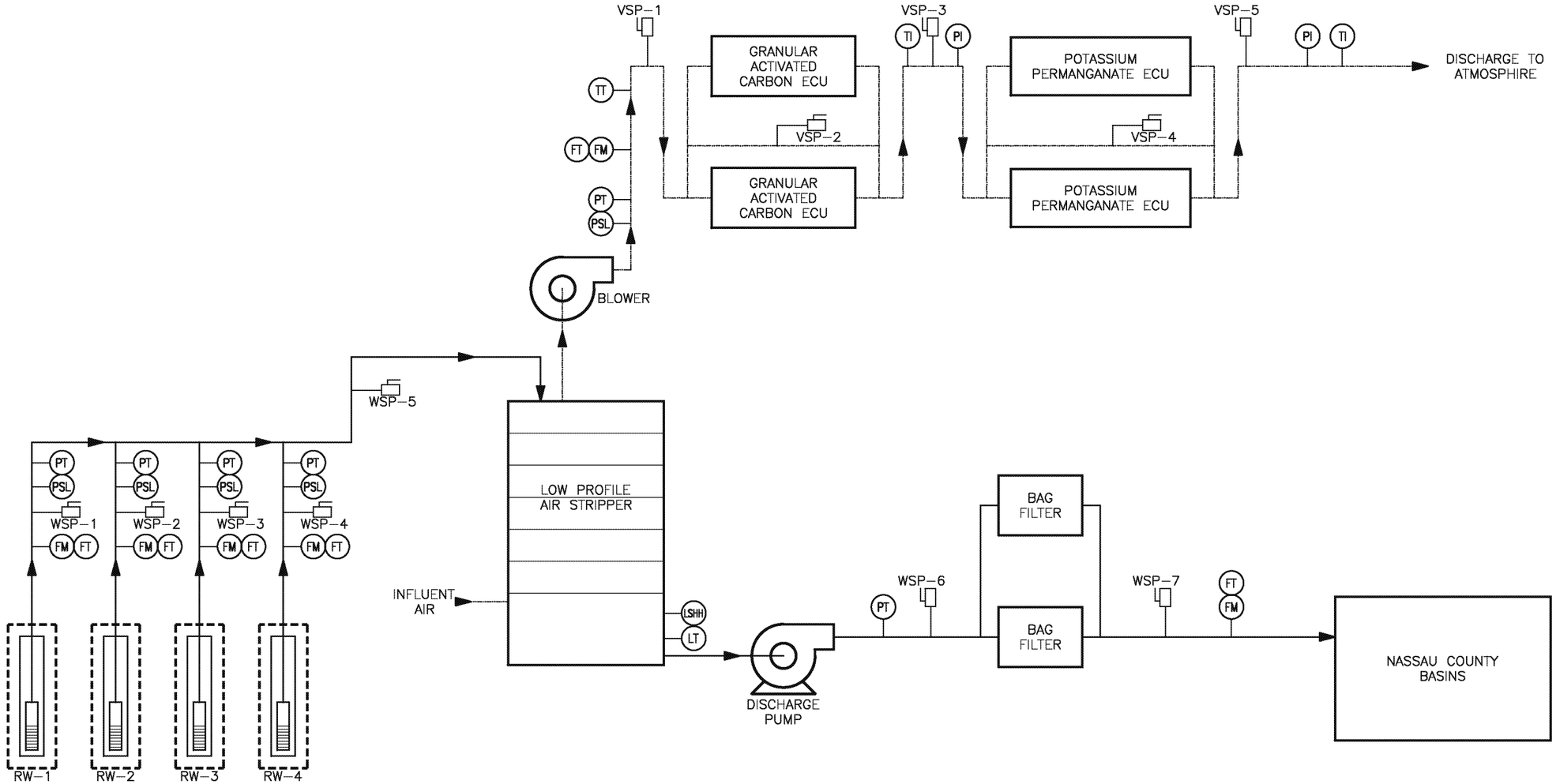
Xr1498X01



LEGEND:

- PROCESS WATER
- PROCESS AIR
- FM — INSTRUMENT
- SAMPLE PORT
- FLOW DIRECTION
- **FM** FLOW METER
- **FT** FLOW RATE TRANSMITTER
- **PSL** PRESSURE VACUUM LOW
- **PT** PRESSURE TRANSMITTER
- **PI** PRESSURE INDICATOR
- **LSHH** LEVEL SWITCH HIGH HIGH
- **LT** LEVEL TRANSMITTER
- **TT** TEMPERATURE TRANSMITTER
- **TI** TEMPERATURE INDICATOR
- **WSP** WATER SAMPLE PORT
- **VSP** VAPOR SAMPLE PORT
- **ECU** EMISSION CONTROL UNIT

BETHPAGE PARK GROUNDWATER CONTAINMENT SYSTEM
OPERABLE UNIT 3
(FORMER GRUMMAN SETTLING PONDS)
BETHPAGE, NEW YORK

GROUNDWATER TREATMENT SYSTEM PROCESS SCHEMATIC AND MONITORING LOCATIONS

ARCADIS Design & Consultancy for natural and built assets

FIGURE 3

CITY:SYRACUSE-NY DIV/GROUP:ENV DB:A.SANCHEZ LD:AS PIC:(Opt) PM:(Reqd) TM:(Opt) LYR:(Opt)ON=*;OFF=*REF*
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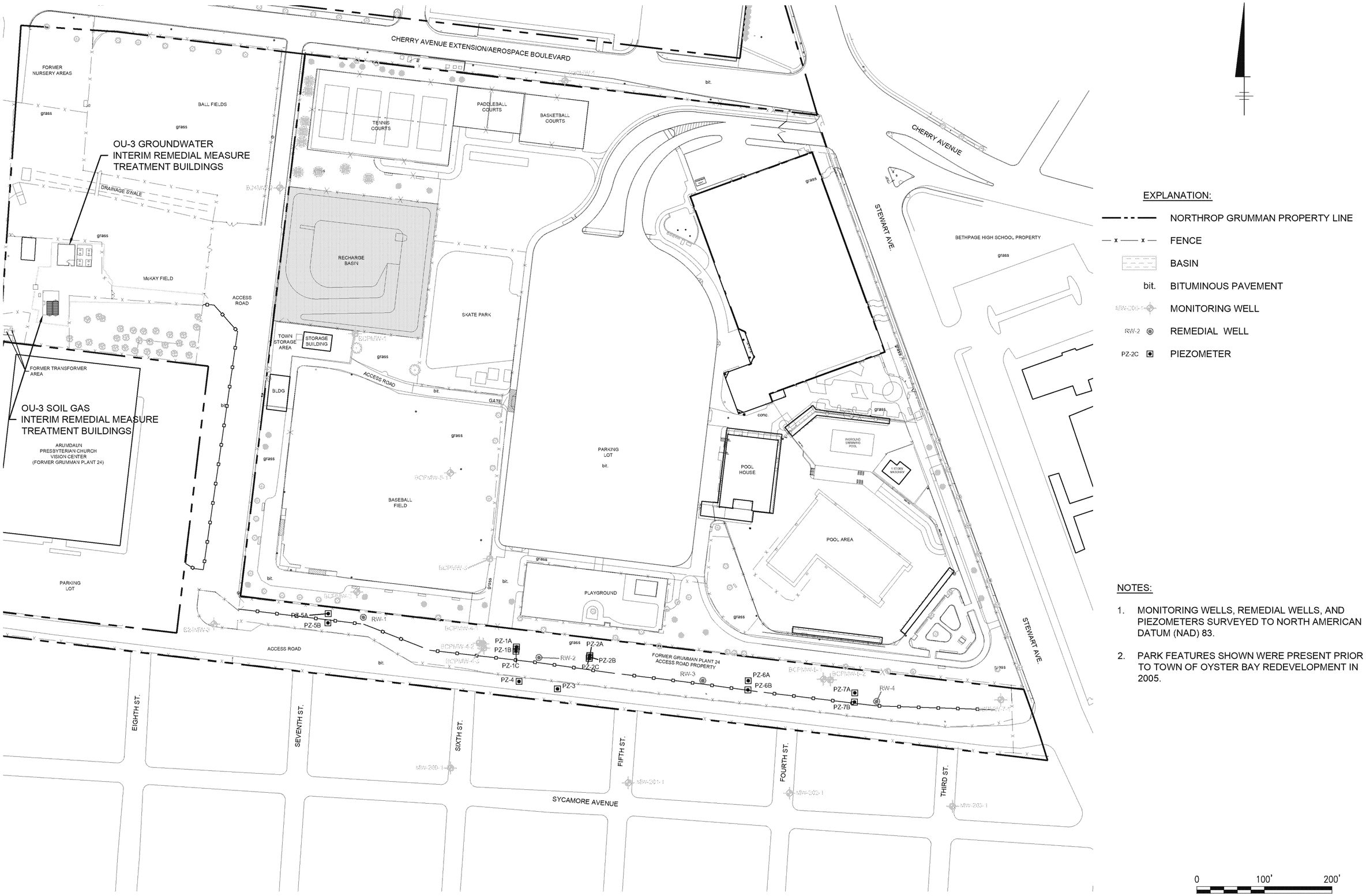

EXPLANATION:

- NORTHROP GRUMMAN PROPERTY LINE
- FENCE
- BASIN
- bit. BITUMINOUS PAVEMENT
- MONITORING WELL
- RW-2 REMEDIAL WELL
- PZ-2C PIEZOMETER

NOTES:

1. MONITORING WELLS, REMEDIAL WELLS, AND PIEZOMETERS SURVEYED TO NORTH AMERICAN DATUM (NAD) 83.
2. PARK FEATURES SHOWN WERE PRESENT PRIOR TO TOWN OF OYSTER BAY REDEVELOPMENT IN 2005.

0 100' 200'

SCALE IN FEET

BETHPAGE PARK GROUNDWATER CONTAINMENT SYSTEM
OPERABLE UNIT 3
(FORMER GRUMMAN SETTLING PONDS)
BETHPAGE, NEW YORK

GROUNDWATER MONITORING NETWORK SITE PLAN

ARCADIS Design & Consultancy for natural and built assets

FIGURE 4

CITY:(Req'd) DIV/GROUP:(Req'd) DB:(Req'd) LD:(Opt) PIC:(Opt) PM:(Req'd) TM:(Opt) LYR:(On/Off/Ref=OFF;*REF*
G:\ENV\CAD\SYRACUSE\ACTIVITY\0114R\11410\MM\411498W02.dwg LAYOUT: 4 SAVED: 11/11/2015 4:33 PM ACADVER: 19.1S (LMS TECH) PAGESETUP: PDF PLOTSTYLETABLE: PLTFULL.CTB PLOTTED: 11/11/2015 4:54 PM BY: STOWELL, GARY
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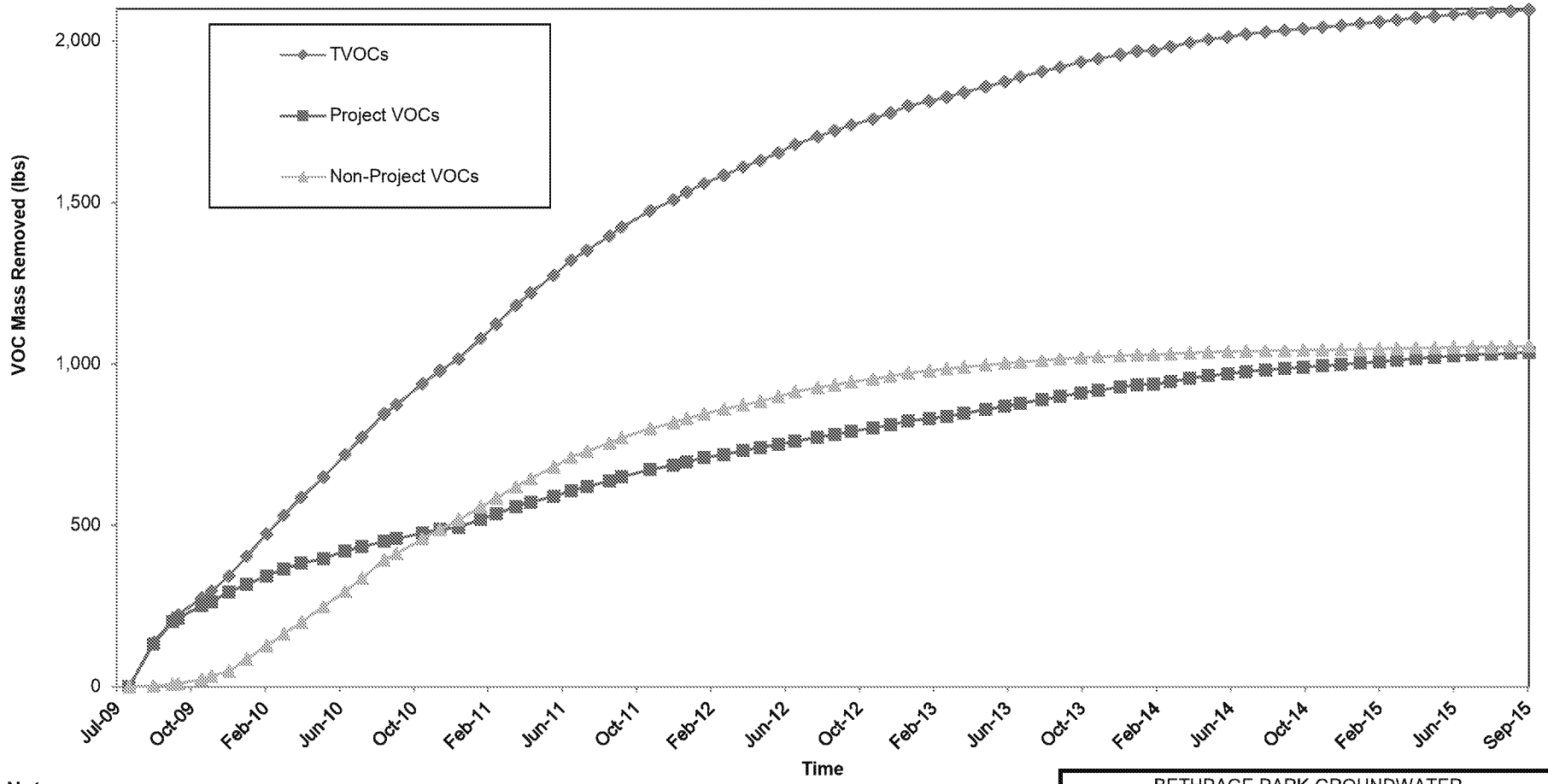


Notes:

VOC = Volatile organic compound.

lbs = Pounds.

TVOCs = Sum of VOCs detected.

Project VOCs = Sum of 1,1,1-trichloroethane; 1,1-dichloroethane; 1,2-dichloroethane; 1,1-dichloroethene; tetrachloroethene; trichloroethene; vinyl chloride; cis-1,2-dichloroethene; trans-1,2-dichloroethene; benzene; toluene; and total xylenes.

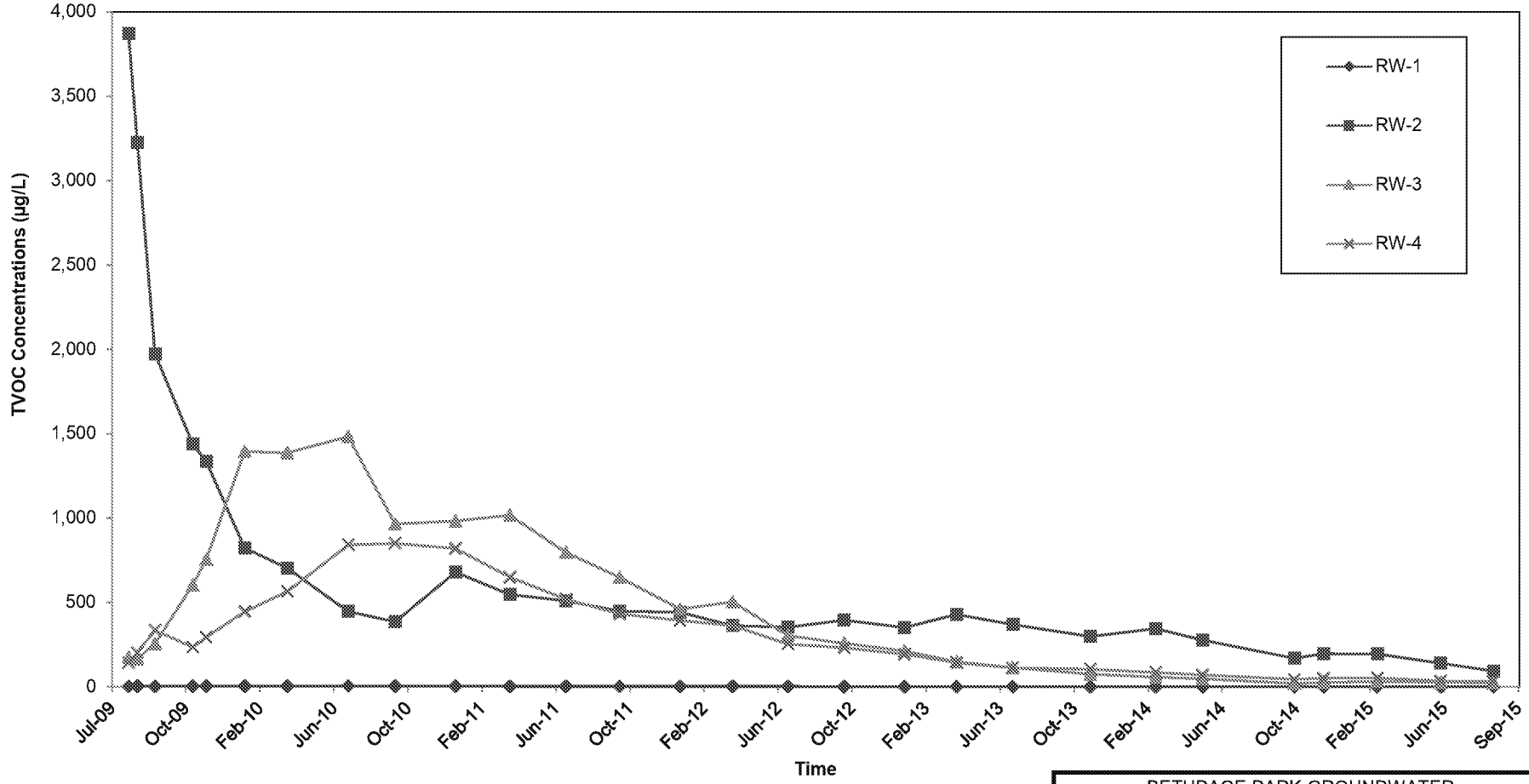
Non-Project VOCs = Sum of VOCs that are not Project VOCs.

BETHPAGE PARK GROUNDWATER
CONTAINMENT SYSTEM, OPERABLE UNIT 3
(FORMER GRUMMAN SETTLING PONDS)
BETHPAGE, NEW YORK

CUMULATIVE TOTAL, PROJECT, AND NON-PROJECT VOC MASS REMOVED THROUGH SEPTEMBER 2015

ARCADIS

FIGURE 5



Notes:

VOC = Volatile organic compound.

µg/L = Micrograms per liter.

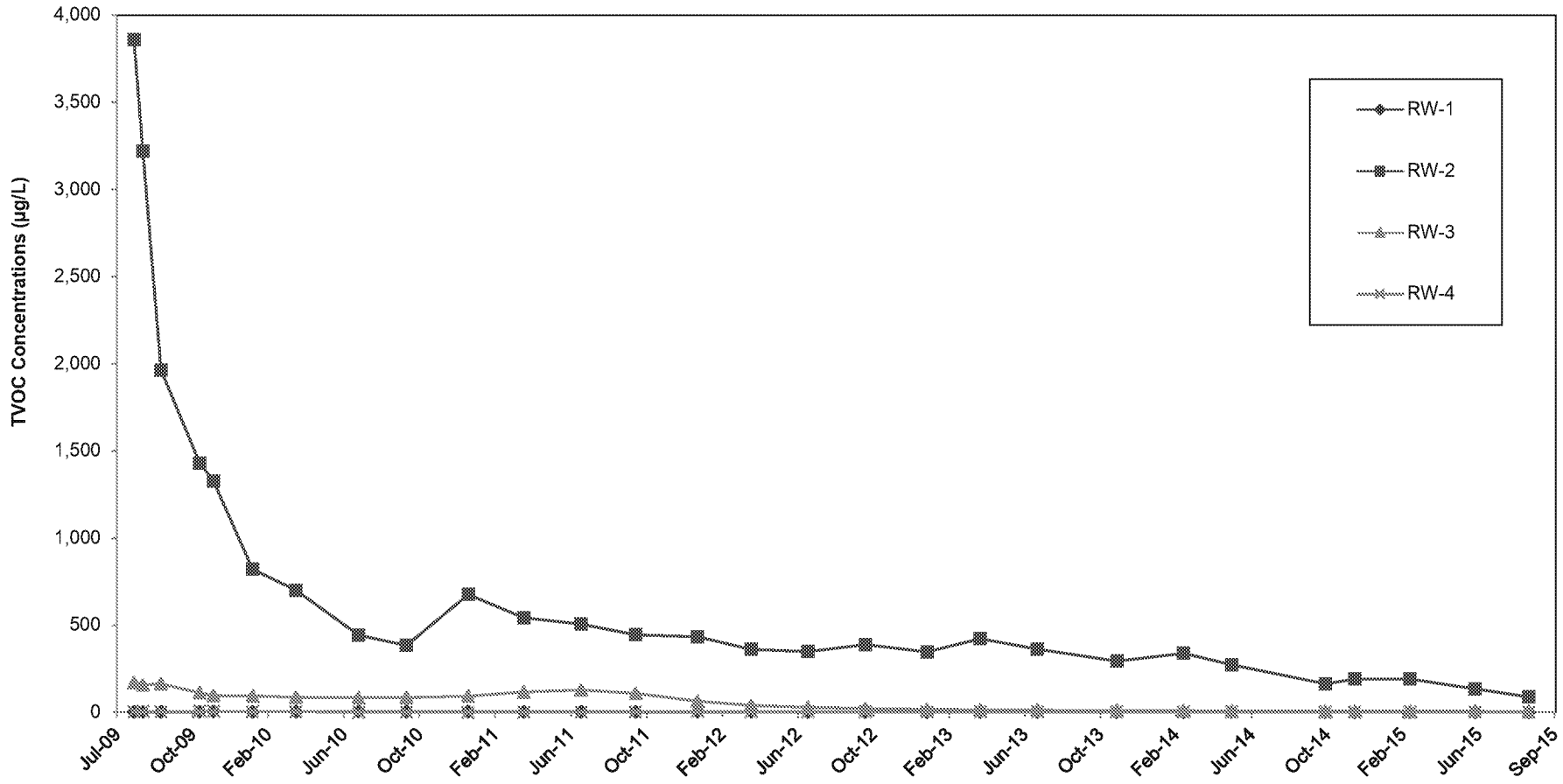
TVOCs = Sum of VOCs detected.

BETHPAGE PARK GROUNDWATER
CONTAINMENT SYSTEM, OPERABLE UNIT 3
(FORMER GRUMMAN SETTLING PONDS)
BETHPAGE, NEW YORK

REMEDIAL WELL TVOC CONCENTRATIONS THROUGH SEPTEMBER 2015

ARCADIS

FIGURE 6A



Notes:

VOC = Volatile organic compound.

µg/L = Micrograms per liter.

TVOCs = Sum of VOCs detected.

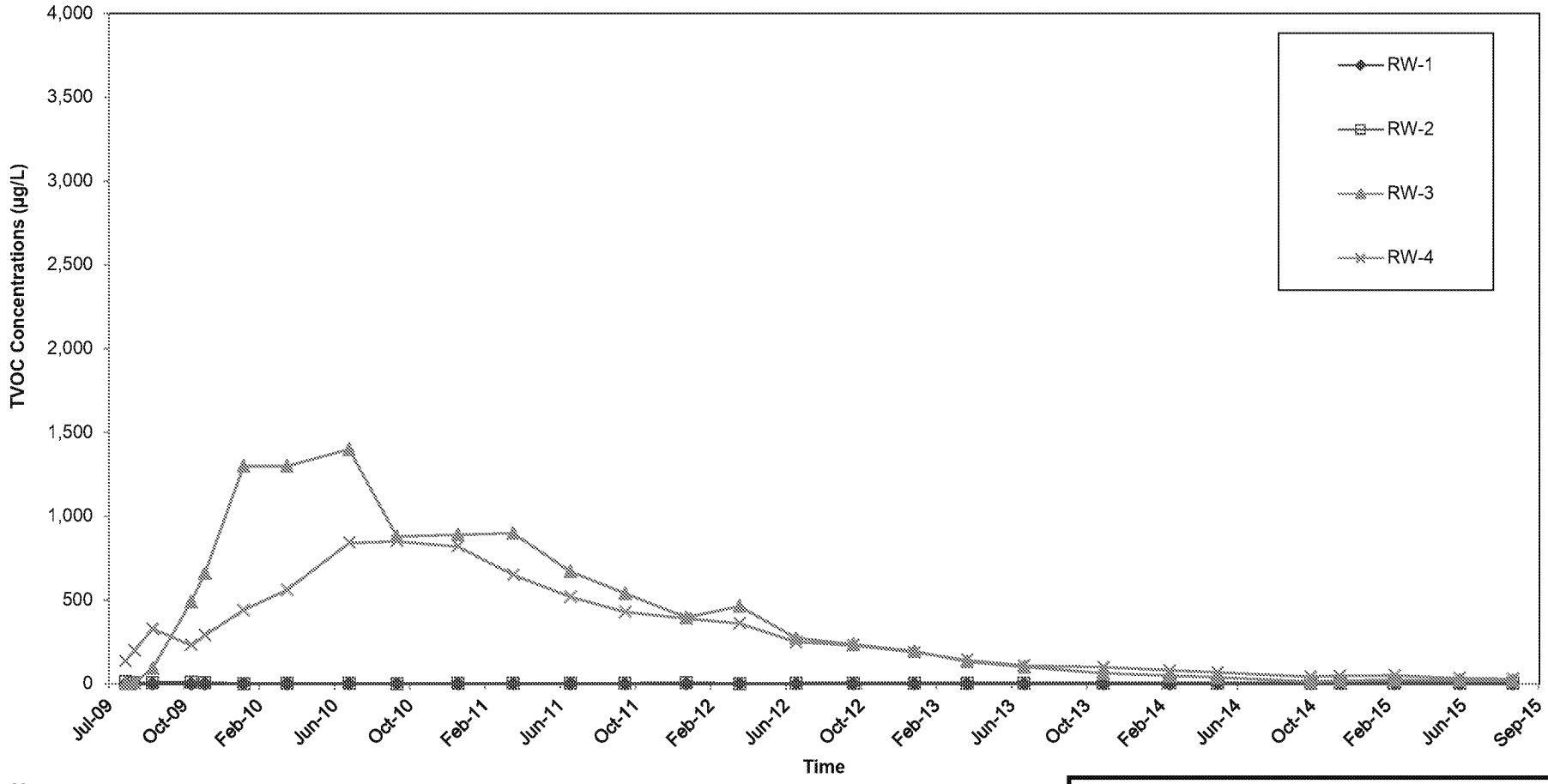
Project VOCs = Sum of 1,1,1-trichloroethane; 1,1-dichloroethane; 1,2-dichloroethane; 1,1-dichloroethene; tetrachloroethene; trichloroethene; vinyl chloride; cis-1,2-dichloroethene; trans-1,2-dichloroethene; benzene; toluene and total xylenes.

BETHPAGE PARK GROUNDWATER
CONTAINMENT SYSTEM, OPERABLE UNIT 3
(FORMER GRUMMAN SETTLING PONDS)
BETHPAGE, NEW YORK

REMEDIAL WELL PROJECT VOC CONCENTRATIONS THROUGH SEPTEMBER 2015

ARCADIS

FIGURE 6B



Notes:

VOC = Volatile organic compound.

µg/L = Micrograms per liter.

TVOCs = Sum of VOCs detected.

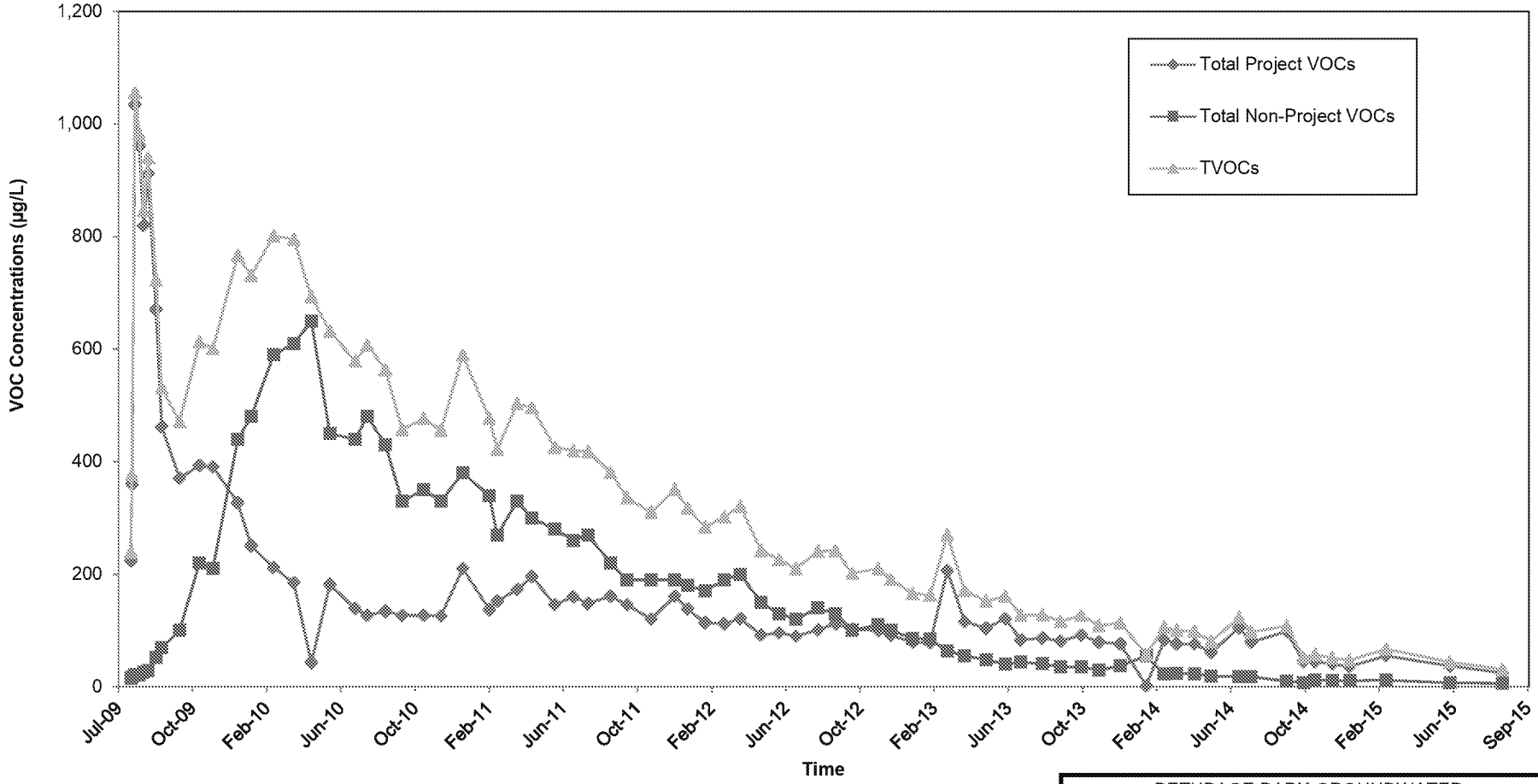
Non-Project VOCs = Sum of TVOCs that are not Project VOCs.

BETHPAGE PARK GROUNDWATER
CONTAINMENT SYSTEM, OPERABLE UNIT 3
(FORMER GRUMMAN SETTLING PONDS)
BETHPAGE, NEW YORK

REMEDIAL WELL NON-PROJECT VOC CONCENTRATIONS THROUGH SEPTEMBER 2015

ARCADIS

FIGURE
6C



Notes:

VOC = Volatile organic compound.

µg/L = Micrograms per liter.

TVOCs = Sum of VOCs detected.

Project VOCs = Sum of 1,1,1-trichloroethane; 1,1-dichloroethane; 1,2-dichloroethane; 1,1-dichloroethene; tetrachloroethene; trichloroethene; vinyl chloride; cis-1,2-dichloroethene; trans-1,2-dichloroethene; benzene; toluene; and total xylenes.

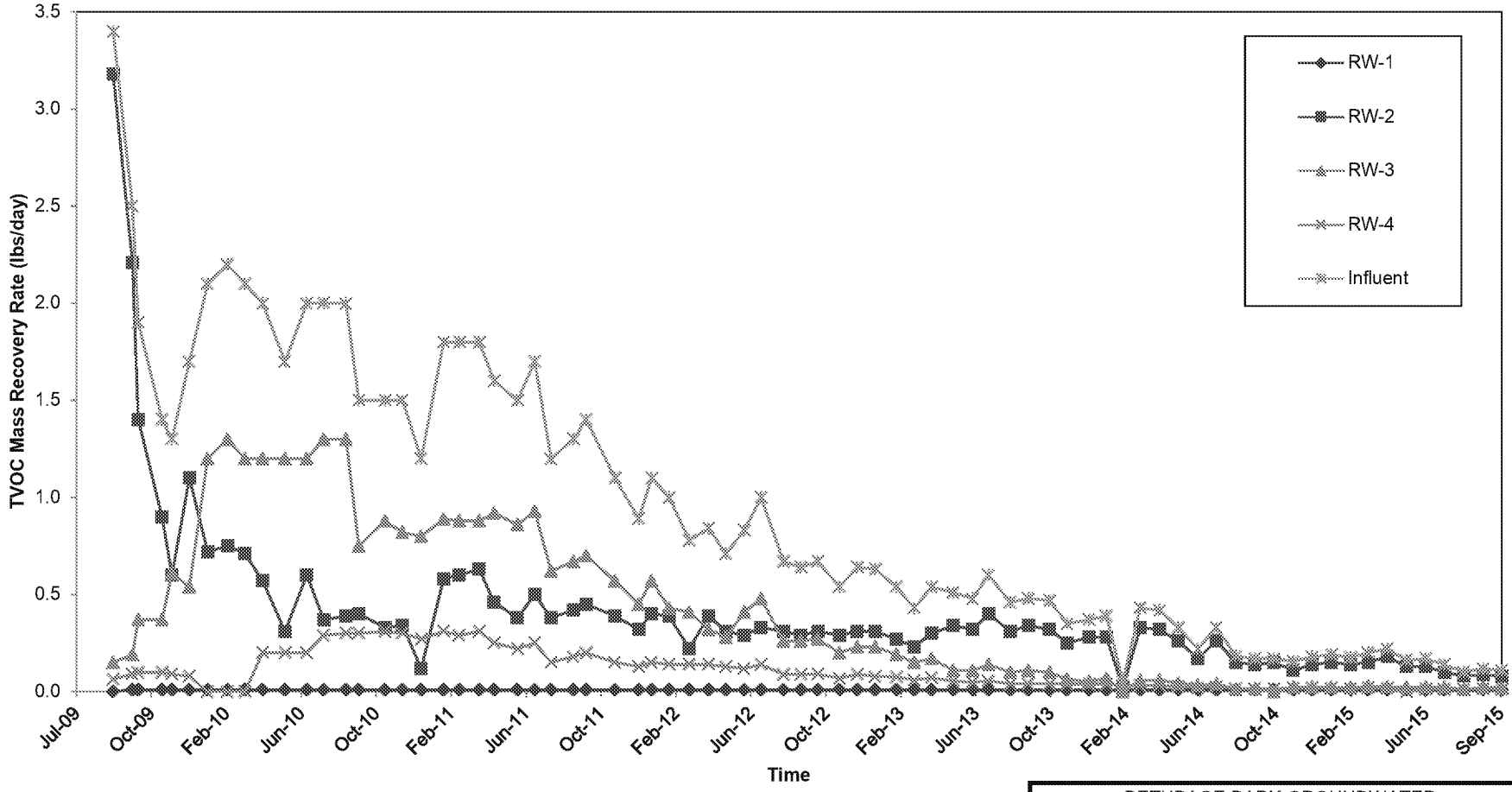
Non-Project VOCs = Sum of VOCs that are not Project VOCs.

BETHPAGE PARK GROUNDWATER
CONTAINMENT SYSTEM, OPERABLE UNIT 3
(FORMER GRUMMAN SETTLING PONDS)
BETHPAGE, NEW YORK

INFLUENT TOTAL, PROJECT, AND NON-PROJECT VOC CONCENTRATIONS THROUGH SEPTEMBER 2015

ARCADIS

FIGURE
7



Notes:

VOC = Volatile organic compound.

lbs/day = Pounds per day.

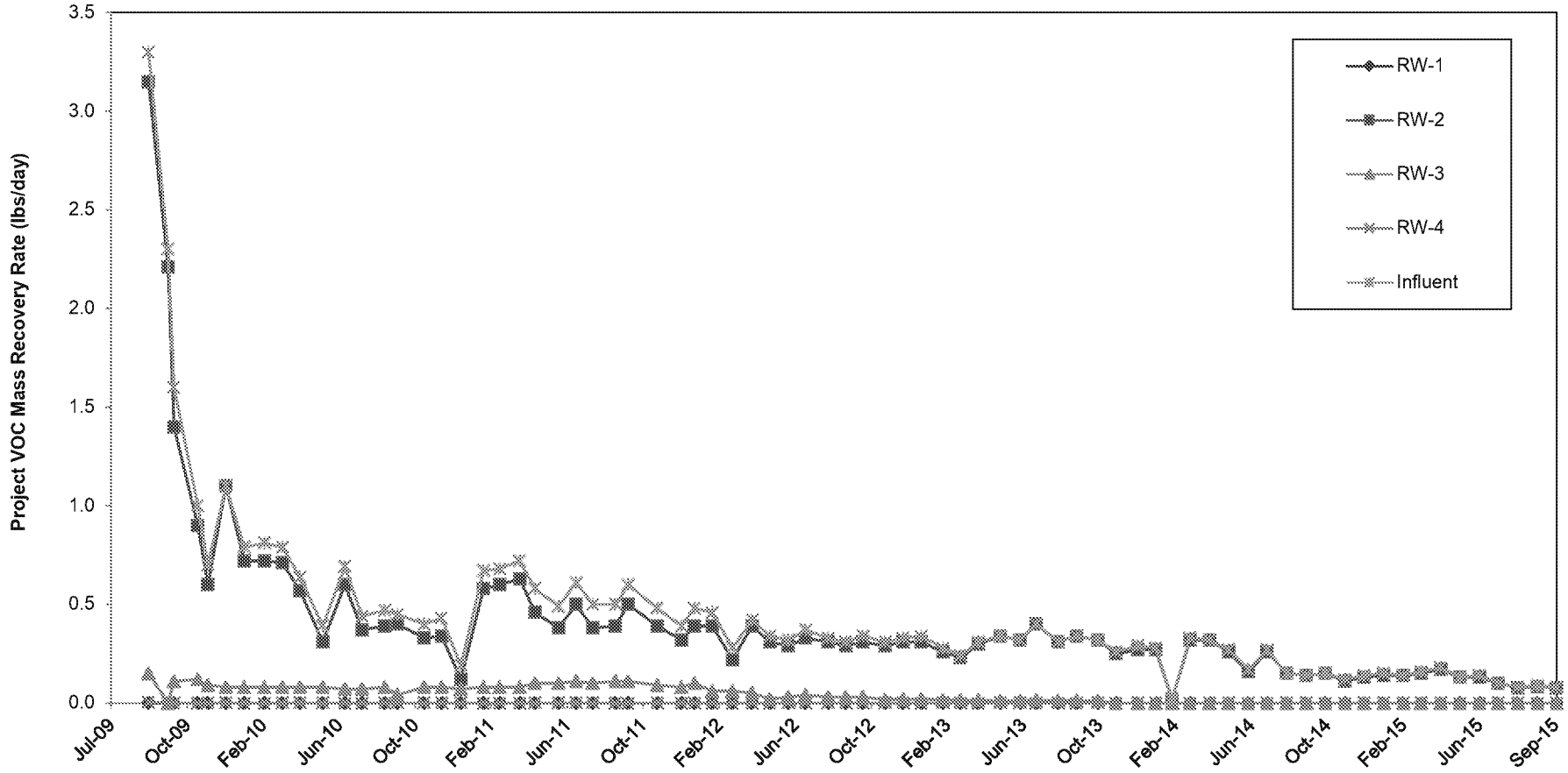
TVOCs = Sum of VOCs detected.

BETHPAGE PARK GROUNDWATER
CONTAINMENT SYSTEM, OPERABLE UNIT 3
(FORMER GRUMMAN SETTLING PONDS)
BETHPAGE, NEW YORK

TVOC MASS RECOVERY RATES THROUGH SEPTEMBER 2015

ARCADIS

FIGURE 8A



Notes:

VOC = Volatile organic compound.

lbs/day = Pounds per day.

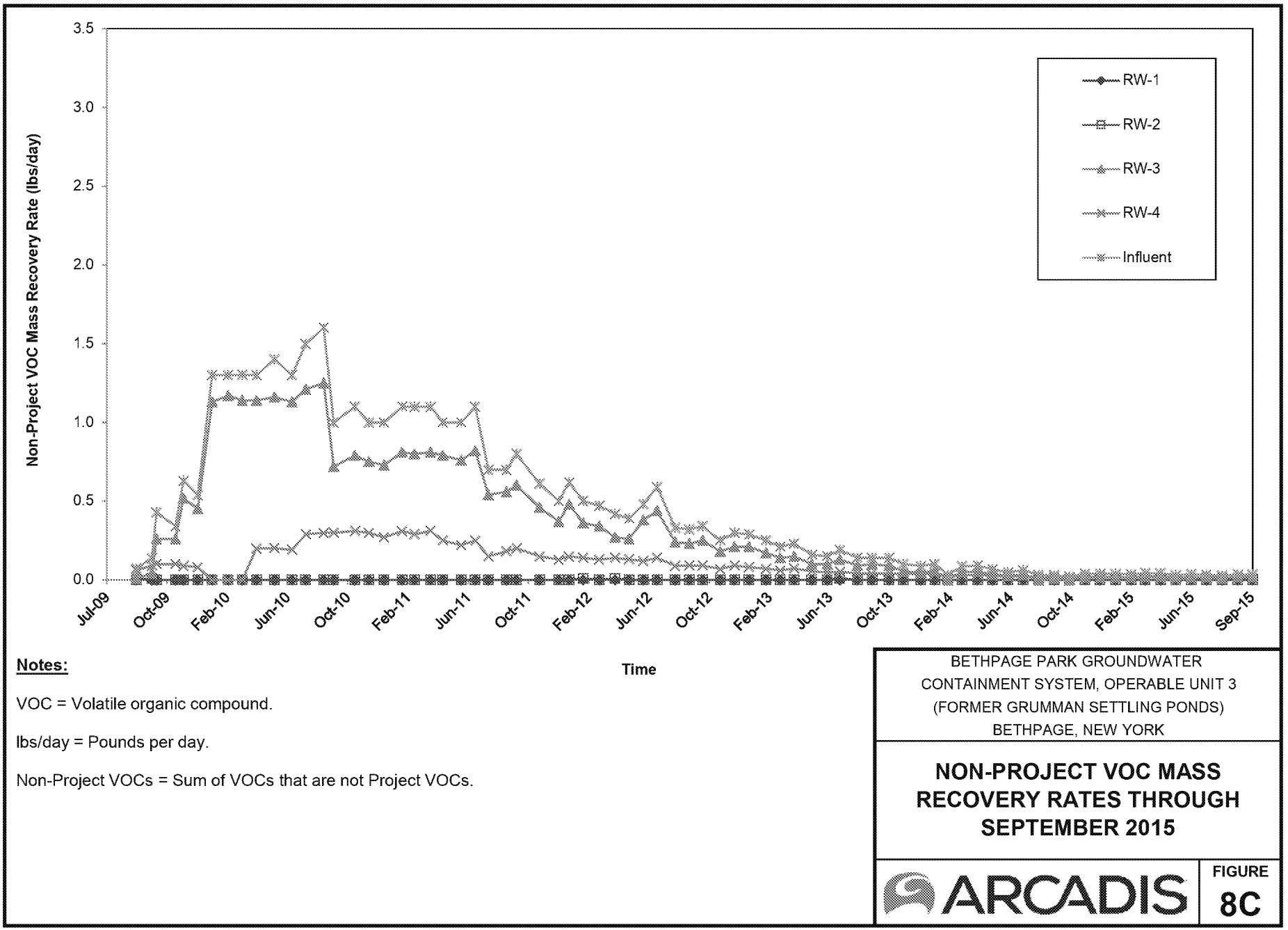
Project VOCs = Sum of 1,1,1-trichloroethane; 1,1-dichloroethane; 1,2-dichloroethane; 1,1-dichloroethene; tetrachloroethene; trichloroethene; vinyl chloride; cis-1,2-dichloroethene; trans-1,2-dichloroethene; benzene; toluene; and total xylenes

BETHPAGE PARK GROUNDWATER
CONTAINMENT SYSTEM, OPERABLE UNIT 3
(FORMER GRUMMAN SETTLING PONDS)
BETHPAGE, NEW YORK

PROJECT VOC MASS RECOVERY RATES THROUGH SEPTEMBER 2015

ARCADIS

FIGURE 8B



Notes:

VOC = Volatile organic compound.

lbs/day = Pounds per day.

Non-Project VOCs = Sum of VOCs that are not Project VOCs.

BETHPAGE PARK GROUNDWATER
CONTAINMENT SYSTEM, OPERABLE UNIT 3
(FORMER GRUMMAN SETTLING PONDS)
BETHPAGE, NEW YORK

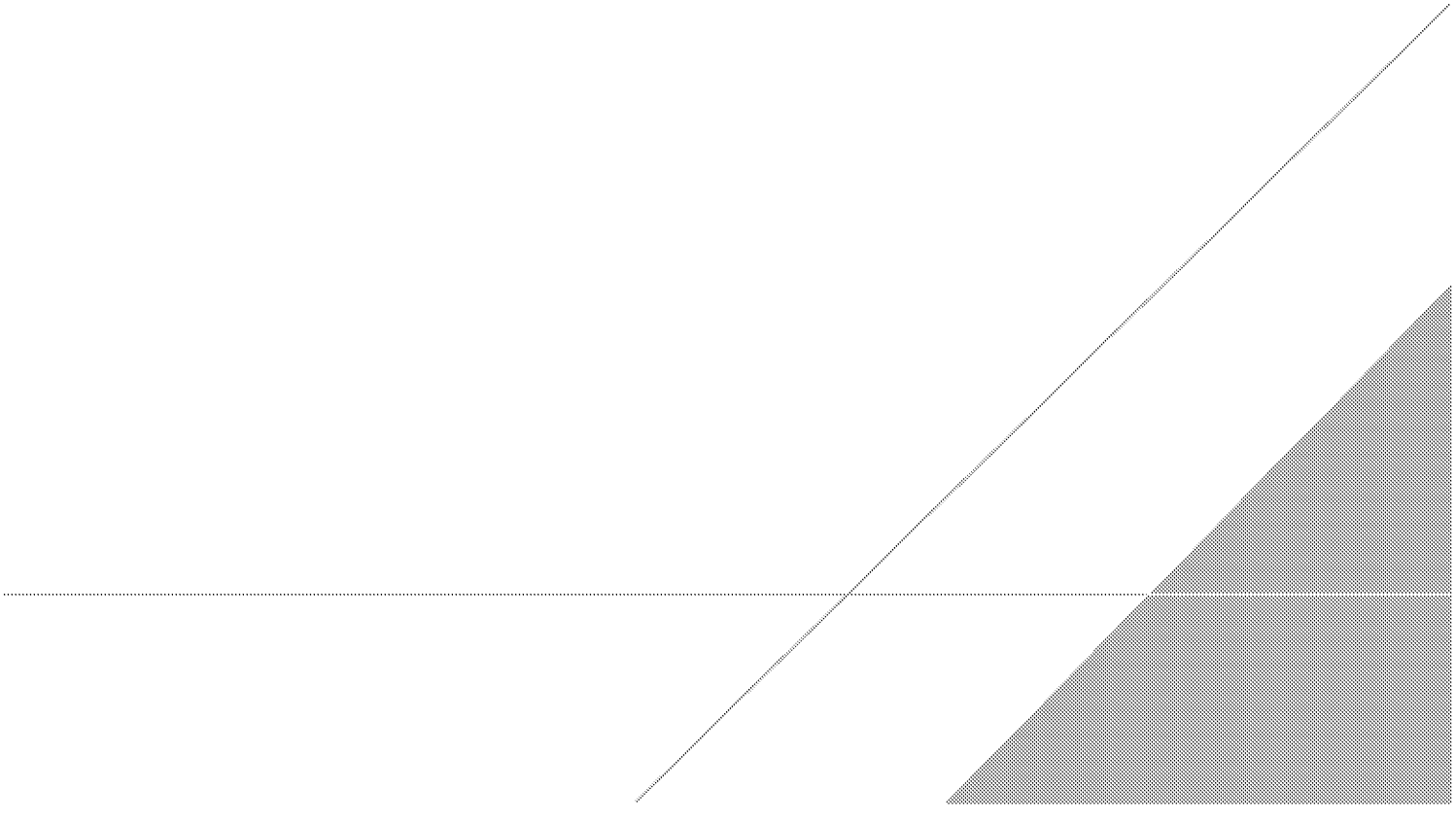
NON-PROJECT VOC MASS RECOVERY RATES THROUGH SEPTEMBER 2015

ARCADIS

FIGURE
8C

APPENDIX A

Well Construction Information and Environmental Effectiveness Monitoring Program



Appendix A-1
Well Construction Information and Environmental Effectiveness Monitoring Program
Bethpage Park Groundwater Containment System, Operable Unit 3
(Former Grumman Settling Ponds), Bethpage, New York [1,2]

ARCADIS Design & Consultancy for natural and built assets

Well ID	Well Diameter (inches)	Depth to Screen Top (ft bls)	Depth to Screen Bottom (ft bls)	Screen Length (ft)	Well Depth (ft)	Well Materials	Water Levels [3]	MONITORING ACTIVITY WATER QUALITY [4] VOC	CH/CF	Fe/Mn
Monitoring Wells										
BCPMW-1	2	50	65	15	65	Sch. 40 PVC	Quarterly	Baseline	Baseline	--
BCPMW-2	2	60	75	15	75	Sch. 40 PVC	Quarterly	Baseline	Baseline	Baseline
BCPMW-3	2	59	74	15	74	Sch. 40 PVC	Quarterly	Baseline	Baseline	Baseline
BCPMW-4-1	4	45	65	20	70	Sch. 40 PVC	Quarterly	Baseline/Semiannual [5]	Baseline/Annual	Baseline
BCPMW-4-2	4	68.5	83.5	15	88.5	Sch. 40 PVC	Quarterly	Baseline/Semiannual [5]	Baseline/Annual	Baseline
BCPMW-4-3	4	115	125	10	130	Sch. 40 PVC	Quarterly	Baseline/Semiannual [5]	Baseline/Annual	Baseline
BCPMW-5-1	4	50	65	15	70	Sch. 80 PVC/ SS	Quarterly	Baseline	Baseline	Baseline
BCPMW-6-1	4	88.5	98.5	10	103.5	Sch. 40 PVC	Quarterly	Baseline/Semiannual [5]	Baseline/Annual	--
BCPMW-6-2	4	133	143	10	148	Sch. 40 PVC	Quarterly	Baseline/Semiannual [5]	Baseline/Annual	--
BCPMW-7-1	4	90	100	10	105	Sch. 40 PVC	Quarterly	Baseline/Semiannual [5]	Baseline/Annual	--
B24MW-2	2	54	74	20	74	PVC	Quarterly	Baseline/Annual	Baseline	--
B24MW-3	2	55	70	15	70	PVC	Quarterly	Baseline/Annual	Baseline	--
B30MW-1	2	57	72	15	72	PVC	Quarterly	Baseline/Annual	Baseline	--
MW-200-1	4	85	95	10	100	Sch. 40 PVC/ SS	Quarterly	Baseline/Semiannual [5]	Baseline/Annual	--
MW-201-1	4	70	80	10	85	Sch. 40 PVC/ SS	Quarterly	Baseline/Semiannual [5]	Baseline/Annual	--
MW-202-1	4	125	135	10	140	Sch. 40 PVC/ SS	Quarterly	Baseline/Semiannual [5]	Baseline/Annual	--
MW-203-1	4	103	113	10	118	Sch. 40 PVC/ SS	Quarterly	Baseline/Semiannual [5]	Baseline/Annual	--
Remedial Wells [6]										
RW-01	8	108	128	20	134	Sch. 80 PVC/SS	Quarterly	Baseline/Quarterly	Baseline/Annual	--
RW-02	6	84	104	20	104	Steel/SS	Quarterly	Baseline/Quarterly	Baseline/Annual	--
RW-03	8	84	104	20	107	Sch. 80 PVC/SS	Quarterly	Baseline/Quarterly	Baseline/Annual	--
RW-04	8	110	130	20	133	Sch. 80 PVC/SS	Quarterly	Baseline/Quarterly	Baseline/Annual	--

See notes on last page.

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ARCADIS Design & Consultancy for natural and built assets

Well ID	Well Diameter (inches)	Depth to Screen Top (ft bls)	Depth to Screen Bottom (ft bls)	Screen Length (ft)	Well Depth (ft)	Well Materials	Water Levels [3]	MONITORING ACTIVITY WATER QUALITY [4] VOC	Cd/Cr	Fe/Mn
Piezometers										
PZ-01a	2	60	65	5	68	Sch. 40 PVC	Quarterly	--	--	--
PZ-01b	1	80	85	5	88	Sch. 40 PVC	Quarterly	--	--	--
PZ-01c	1	130	135	5	138	Sch. 40 PVC	Quarterly	--	--	--
PZ-02a	2	60	65	5	68	Sch. 40 PVC	Quarterly	--	--	--
PZ-02b	1	80	85	5	85	Sch. 40 PVC	Quarterly	--	--	--
PZ-02c	1	130	135	5	138	Sch. 40 PVC	Quarterly	--	--	--
PZ-03	1	80	85	5	88	Sch. 40 PVC	Quarterly	--	--	--
PZ-04	1	80	85	5	88	Sch. 40 PVC	Quarterly	--	--	--
PZ-05a	2	65	70	5	74	Sch. 40 PVC	Quarterly	--	--	--
PZ-05b	1	110	115	5	117	Sch. 40 PVC	Quarterly	--	--	--
PZ-06a	2	65	70	5	72	Sch. 40 PVC	Quarterly	--	--	--
PZ-06b	1	90	95	5	97	Sch. 40 PVC	Quarterly	--	--	--
PZ-07a	2	65	70	5	72	Sch. 40 PVC	Quarterly	--	--	--
PZ-07b	1	113	118	5	120	Sch. 40 PVC	Quarterly	--	--	--

Notes:

(1) Water samples will be collected and analyzed in accordance with the method and procedures described in the Sampling and Analysis Plan (SAP).
(2) Approximate locations of the wells and piezometers in the OU3 Bethpage Park Groundwater Containment System are shown in Figure 4.
(3) Water levels will be measured in all wells/piezometers during the baseline monitoring event. Water levels will be measured in accordance with the procedures presented in the SAP.
(4) VOC: VOC analyses per NYSDEC ASP 2005, Method OLM 4.3 (prior to September 1, 2014) and per USEPA Method 8260C (after September 1, 2014).
Cd/Cr: Cadmium and Chromium using USEPA Method 6010C.
Fe/Mn: Iron and Manganese using USEPA Method 6010C, both total and dissolved.
(5) Semiannual wells will be monitored annually after Year 1.
(6) Some of the analyses listed here are also covered in the Remedial System Sampling Program (Table B-1) and some of the analyses and/or frequencies may be modified based on review of short-term and/or long-term testing results. (e.g. the Cd/Cr sampling frequency was changed from quarterly to annually in 2011).

Acronyms\Key:

Sch. 80 PVC	Schedule 80 polyvinyl chloride.
Sch. 40 PVC	schedule 40 polyvinyl chloride.
SS	Stainless steel.
Steel	Low carbon steel.
ft	Feet.
ft ms	Feet relative to mean sea level.
ft bls	Feet below land surface.
--	Not applicable.
VOC	Volatile organic compound.
USEPA	United States Environmental Protection Agency

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APPENDIX B

Compliance and Performance Program and Water Sample Analytical Results

ARCADIS Design & Consultancy for natural and built assets

Sample Location/Instrument [1]	Parameter (Method) [2]	Frequency			
		Short Term [3] (first month)	Short Term [3] (five month period following first month)	Long Term [4]	SCADA Data Acquisition
Water Samples [5]					
Remedial Well 1 (WSP-1)	VOCs (USEPA Method 8260C)	Bi-Weekly	Quarterly	Quarterly	NA
	Iron (USEPA 6010C)	Bi-Weekly	Annually	Annually	NA
	Cadmium and Chromium (USEPA 6010C)[11]				
	---		Annually	Annually	NA
Remedial Well 2 (WSP-2)	VOCs (USEPA Method 8260C)	Bi-Weekly	Quarterly	Quarterly	NA
	Iron (USEPA 6010C)	Bi-Weekly	Annually	Annually	NA
	Cadmium and Chromium (USEPA 6010C)[11]				
	---		Annually	Annually	NA
Remedial Well 3 (WSP-3)	VOCs (USEPA Method 8260C)	Bi-Weekly	Quarterly	Quarterly	NA
	Iron (USEPA 6010C)	Bi-Weekly	Annually	Annually	NA
	Cadmium and Chromium (USEPA 6010C)[11]				
	---		Annually	Annually	NA
Remedial Well 4 (WSP-4)	VOCs (USEPA Method 8260C)	Bi-Weekly	Quarterly	Quarterly	NA
	Iron (USEPA 6010C)	Bi-Weekly	Annually	Annually	NA
	Cadmium and Chromium (USEPA 6010C)[11]				
	---		Annually	Annually	NA
Air Stripper Influent (WSP-5)	VOCs (USEPA Method 8260C)	1-hr [6]; Days 1, 3, & Weekly	Monthly	Quarterly	NA
	Iron (USEPA 6010C)	1-hr [6]; Days 1, 3, & Weekly	Monthly	Quarterly	NA
Air Stripper Effluent (WSP-6)	Iron (USEPA 6010C)	1-hr [6]; As Needed	As Needed	As Needed	NA
Plant Effluent (WSP-7)	**VOCs (USEPA Method 8260C)**	**1-hr [6]; Days 1, 3, & Weekly**	**Monthly**	**Monthly**	NA
	Iron (USEPA 6010C)	**1-hr [6]; Days 1, 3, & Weekly**	**Monthly**	**Monthly**	NA
	Mercury (USEPA 7470A) [7]	**1-hr [6]; Days 1, 3, & Weekly**	**Monthly**	**Monthly**	NA
	pH (field) [8]	**1-hr [6]; Days 1, 3, & Weekly**	**Monthly**	**Monthly**	NA
	and		Quarterly	Quarterly	NA
Air Samples [9] [10]					
Air Stripper Effluent/ECU-1 Influent (VSP-1)	VOCs (TO-15 Modified)	Monthly	Monthly	Quarterly	NA
ECU-1 Effluent/ECU-2 Influent (VSP-2)	VOCs (TO-15 Modified)	As Needed	As Needed	As Needed	NA
ECU-2 Effluent/ECU-3 Influent (VSP-3)	VOCs (TO-15 Modified)	As Needed	As Needed	As Needed	NA
ECU-3 Effluent/ECU-4 Influent (VSP-4)	VOCs (TO-15 Modified)	As Needed	As Needed	As Needed	NA
Total Effluent (VSP-5)	**VOCs (TO-15 Modified)**	**Monthly**	**Monthly**	**Quarterly**	NA

See notes on last page.

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ARCADIS Design & Consultancy for natural and built assets

Sample Location/Instrument [1]	Parameter (Method) [2]	Frequency			
		Short Term [3] (first month)	Short Term [3] (five month period following first month)	Long Term [4]	SCADA Data Acquisition
Water Flow Measurements					
Remedial Well RW-1 (FT - 110)	Flow rate (gpm + total gal.)	(Daily -1st week) Weekly	Weekly	Weekly	Continuously
Remedial Well RW-2 (FT - 120)	Flow rate (gpm + total gal.)	(Daily -1st week) Weekly	Weekly	Weekly	Continuously
Remedial Well RW-3 (FT - 130)	Flow rate (gpm + total gal.)	(Daily -1st week) Weekly	Weekly	Weekly	Continuously
Remedial Well RW-4 (FT - 140)	Flow rate (gpm + total gal.)	(Daily -1st week) Weekly	Weekly	Weekly	Continuously
Combined Influent (FR - 200)	Flow rate (gpm + total gal.)	(Daily -1st week) Weekly	Weekly	Weekly	Continuously
System Effluent (FT-700)	Flow rate (gpm + total gal.)	(Daily -1st week) Weekly	Weekly	Weekly	Continuously
Air Flow Measurements					
Air Stripper Effluent (FT-500)	Flow rate (SCFM)	(Daily -1st week) Weekly	Weekly	Weekly	Continuously
Water Pressure Measurements					
Remedial Well RW-1 (PT - 110)	Pressure (i.w.g.)	(Daily -1st week) Weekly	Weekly	Weekly	Continuously
Remedial Well RW-2 (PT - 120)	Pressure (i.w.g.)	(Daily -1st week) Weekly	Weekly	Weekly	Continuously
Remedial Well RW-3 (PT - 130)	Pressure (i.w.g.)	(Daily -1st week) Weekly	Weekly	Weekly	Continuously
Remedial Well RW-4 (PT - 140)	Pressure (i.w.g.)	(Daily -1st week) Weekly	Weekly	Weekly	Continuously
Air Stripper Effluent (PT-700)	Pressure (i.w.g.)	(Daily -1st week) Weekly	Weekly	Weekly	Continuously
Air Temperature & Relatively Humidity Measurements					
Air Stripper Effluent (TT-500)	Temperature	Weekly	Weekly	Weekly	Continuously
ECU Mid-Train (TI-503)	Temperature	Weekly	Weekly	Weekly	NA
Effluent (TI-603)	Temperature	Weekly	Weekly	Weekly	NA
Air Pressure Measurements					
Air Stripper Effluent (PT-500)	Pressure (i.w.g.)	(Daily -1st week) Weekly	Monthly	Quarterly	Continuously
ECU #1 Influent (PI-501)	Pressure (i.w.g.)	(Daily -1st week) Weekly	Monthly	Quarterly	NA
ECU #2 Influent (PI-502)	Pressure (i.w.g.)	(Daily -1st week) Weekly	Monthly	Quarterly	NA
ECU #3 Influent (PI-601)	Pressure (i.w.g.)	(Daily -1st week) Weekly	Monthly	Quarterly	NA
ECU #4 Influent (PI-602)	Pressure (i.w.g.)	(Daily -1st week) Weekly	Monthly	Quarterly	NA
System Effluent (PI-603)	Pressure (i.w.g.)	(Daily -1st week) Weekly	Monthly	Quarterly	NA

See notes on last page.

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ARCADIS Design & Consultancy for natural and built assets

Sample Location/Instrument [1]	Parameter (Method) [2]	Frequency		
		Short Term [3] (first month)	Short Term [3] (five month period following first month)	Long Term [4] SCADA Data Acquisition

Notes:

(1) Refer to Figure 3 of this Operation, Maintenance, & Monitoring (OM&M) Report and Appendix E of the Groundwater IRM OM&M Manual (OM&M Manual (ARCADIS 2009)) for a diagram showing referenced sample locations and measurement points.
(2) Parameters/methods may be modified based on review of short-term and/or long-term testing results. Parameters shown in **Bold** indicate parameters that require NYSDEC notification/approval prior to change in monitoring schedule.
(3) Short-term schedule is tentative. Modification may be required/recommended based on the results of start-up and performance testing.
(4) Long-term schedule is tentative. Modification may be required/recommended based on the results of short-term testing or water quality trends.
(5) Water samples will be collected in accordance with the methods described in the Sampling and Analysis Plan, which is included as Appendix A of the OM&M Manual (ARCADIS 2009). Samples will be analyzed in accordance with the methods and procedures described in the Sampling and Analysis Plan.
(6) Per NYSDEC request, a 1-hr pilot test was performed during system shake-down. The 1-hr pilot test samples were also analyzed for Mercury (Hg).
(7) Per the interim treated effluent (water) discharge criteria provided in the NYSDEC letter dated March 19, 2009, select samples were analyzed for Mercury (Hg).
(8) As authorized by the NYSDEC, the pH monitoring frequency was reduced from weekly to monthly beginning on February 8, 2010.
(9) Air samples collected and analyzed in accordance with methods described in the Sampling and Analysis Plan, which is included as Appendix A of the OM&M Manual (ARCADIS 2009).
(10) Additional air samples will be collected to help calculate media usage rates and to help determine media changeout frequencies.
(11) Cadium and Chromium analyses are part of the Environmental Effectiveness Monitoring Program (Table A-1) and the original discharge permit application. They are included here for consistency.

Acronyms\Key:

NA	Not Applicable.
---	Not Required
ECU	Emissions control unit.
VOCs	Volatile organic compounds (refer Tables D-3 and D-5 in the Quality Assurance Project Plan (QAPP) (Appendix D of the OM&M Manual (ARCADIS 2009)) for the analyte lists for aqueous and air samples, respectively).
gal.	Gallons.
gpm	Gallons per minute.
i.w.g.	Inches water gauge.
NYSDEC	New York State Department of Environmental Conservation.
EPA	U.S. Environmental Protection Agency.
SCADA	Supervisory Control And Data Acquisition.
OM&M	Operation, maintenance and monitoring.

ED_002631A_00010847-00066

COMPOUND (µg/L)	Sample ID: Sample Location: Sample Date:	WSP-07 Effluent 7/22/2015
Volatile Organic Compounds		
1,1,1-Trichloroethane		< 1.0 U
1,1,2,2-Tetrachloroethane		< 1.0 U
1,1,2-Trichloroethane		< 1.0 U
1,1-Dichloroethane		< 1.0 U
1,1-Dichloroethene		< 1.0 U
1,2-Dichloroethane		< 1.0 U
1,2-Dichloropropane		< 1.0 U
2-Butanone		< 10 U
4-Methyl-2-Pentanone		< 5.0 U
Acetone		< 10 U
Benzene		< 0.5 U
Bromodichloromethane		< 1.0 U
Bromoform		< 1.0 U
Bromomethane		< 2.0 U
Carbon Disulfide		< 2.0 U
Carbon Tetrachloride		< 1.0 U
Chlorobenzene		< 1.0 U
Chlorodibromomethane		< 1.0 U
Chlorodifluoromethane (Freon 22)		< 5.0 U
Chloroethane		< 1.0 U
Chloroform		< 1.0 U
Chloromethane		< 1.0 U
cis-1,2-Dichloroethene		< 1.0 U
cis-1,3-Dichloropropene		< 1.0 U
Dichlorodifluoromethane (Freon 12)		< 2.0 U
Dichloromethane		< 2.0 U
Ethylbenzene		< 1.0 U
Methyl N-Butyl Ketone		< 1.0 U
Methyl-Tert-Butylether		< 1.0 U
Styrene (Monomer)		< 1.0 U
Tetrachloroethene		< 1.0 U
Toluene		< 1.0 U
trans-1,2-Dichloroethene		< 1.0 U
trans-1,3-Dichloropropene		< 1.0 U
Trichloroethene		< 1.0 U
Trichlorofluoromethane (Freon 11)		< 2.0 U
Trichlorotrifluoroethane (Freon 113)		< 1.0 U
Vinyl Chloride		< 1.0 U
Xylene-o		< 1.0 U
Xylenes - m,p		< 1.0 U
Tentatively Identified Compounds		0
Total VOCs [4]		0

See notes on last page.

ED_002631A_00010847-00067

COMPOUND (µg/L)	Sample ID: Sample Location: Sample Date:	WSP-07 Effluent 7/22/2015
Metals		
Cadmium (Dissolved)		--
Cadmium (Total)		--
Chromium (Dissolved)		--
Chromium (Total)		--
Iron (Dissolved)		**250**
Iron (Total)		**259**
Manganese (Dissolved)		--
Manganese (Total)		--
Mercury (Dissolved)		--
Mercury (Total)		--

Notes:

(1) Water samples collected by Arcadis on the dates shown and submitted to a NYSDOH ELAP certified laboratory for VOC analyses per USEPA Method 8260C, for iron analyses per USEPA Method 6010C and for mercury analyses per USEPA Method 7470A.
(2) Refer to Figure 3 of this OM&M Report for schematic sample locations.
(3) Results validated following protocols specified in the Sampling and Analysis Plan (Appendix A) of the Groundwater OM&M Manual (ARCADIS
(4) "Total VOCs" represents the sum of individual concentrations of VOCs detected. Values shown have been rounded to the nearest whole number.

Acronyms\Key:

Bold value indicates a detection.

ELAP	Environmental Laboratory Approval Program
NYSDOH	New York State Department of Health
OM&M	Operation, maintenance and monitoring.
USEPA	United States Environmental Protection Agency.
VOC	Volatile organic compound.
µg/L	Micrograms per liter.
--	Not analyzed.
< 5 U	Compound not detected above its laboratory quantification limit.

ED_002631A_00010847-00068

COMPOUND (ug/L) / Sample ID / Sample Location / Sample Date	WSP-01 RW-1 8/19/2015	WSP-02 RW-2 8/19/2015	WSP-02 (DUP) RW-2 8/19/2015	WSP-03 RW-3 8/19/2015	WSP-04 RW-4 8/19/2015	WSP-05 Influent 8/19/2015	WSP-07 Effluent 8/19/2015
Volatile Organic Compounds							
1,1,1-Trichloroethane	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
1,1,2,2-Tetrachloroethane	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
1,1,2-Trichloroethane	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
1,1-Dichloroethane	< 1.0 U	**0.94 J**	**0.86 J**	< 1.0 U	**0.36 J**	**0.26 J**	< 1.0 U
1,1-Dichloroethene	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
1,2-Dichloroethane	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
1,2-Dichloropropane	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
2-Butanone	< 10 U	< 10 U	< 10 U	< 10 U	< 10 U	< 10 U	< 10 U
4-Methyl-2-Pentanone	< 5.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 5.0 U
Acetone	< 10 U	< 10 U	< 10 U	< 10 U	< 10 U	< 10 U	< 10 U
Benzene	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U
Bromodichloromethane	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
Bromoform	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
Bromomethane	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U
Carbon Disulfide	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U
Carbon Tetrachloride	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
Chlorobenzene	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
Chlorodibromomethane	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
Chlorodifluoromethane (Freon 22)	< 5.0 U	< 5.0 U	< 5.0 U	**9.6**	**30**	**6.2**	< 5.0 U
Chloroethane	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
Chloroform	**0.20 J**	**3.3**	**3.4**	**9.9**	**0.38 J**	**3.9**	< 1.0 U
Chloromethane	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
cis-1,2-Dichloroethene	< 1.0 U	**30.2**	**30.1**	**1.9**	< 1.0 U	**8.3**	< 1.0 U
cis-1,3-Dichloropropene	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
Dichlorodifluoromethane (Freon 12)	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U
Dichloromethane	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U
Ethylbenzene	< 1.0 U	**1.4**	**1.4**	< 1.0 U	< 1.0 U	**0.34 J**	< 1.0 U
Methyl N-Butyl Ketone	< 5.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 5.0 U
Methyl-Tert-Butylether	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
Styrene (Monomer)	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
Tetrachloroethene	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	**0.61 J**	< 1.0 U	< 1.0 U
Toluene	< 1.0 U	**9.5**	**9.4**	< 1.0 U	< 1.0 U	**2.5**	< 1.0 U
trans-1,2-Dichloroethene	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
trans-1,3-Dichloropropene	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
Trichloroethene	< 1.0 U	**10**	**9.9**	**2.2**	**0.54 J**	**3.4**	< 1.0 U
Trichlorofluoromethane (Freon 11)	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U
Trichlorotrifluoroethane (Freon 113)	< 5.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 5.0 U
Vinyl Chloride	< 1.0 U	**37**	**37**	< 1.0 U	< 1.0 U	**10**	< 1.0 U
Xylene-o	< 1.0 U	**0.52 J**	**0.45 J**	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
Xylenes - m,p	< 1.0 U	**0.97 J**	**0.95 J**	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
Tentatively Identified Compounds	0	0	0	0	0	0	0
Total VOCs [4]	**0.2**	**94**	**93**	**24**	**32**	**35**	0

See notes on last page.

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COMPOUND (µg/L) / Sample ID / Sample Location / Sample Date	WSP-01 RW-1 8/19/2015	WSP-02 RW-2 8/19/2015	WSP-02 (DUP) RW-2 8/19/2015	WSP-03 RW-3 8/19/2015	WSP-04 RW-4 8/19/2015	WSP-05 Influent 8/19/2015	WSP-07 Effluent 8/19/2015
Metals							
Cadmium (Dissolved)	--	--	--	--	--	--	< 3.0 U
Cadmium (Total)	--	--	--	--	--	--	< 3.0 U
Chromium (Dissolved)	--	--	--	--	--	--	< 10 U
Chromium (Total)	--	--	--	--	--	--	< 10 U
Iron (Dissolved)	--	--	--	--	--	**248**	**251**
Iron (Total)	--	--	--	--	--	**981**	**299**
Manganese (Dissolved)	--	--	--	--	--	--	--
Manganese (Total)	--	--	--	--	--	--	--
Mercury (Dissolved)	--	--	--	--	--	--	--
Mercury (Total)	--	--	--	--	--	--	< 0.20 U

Notes:

(1) Water samples collected by Arcadis on the dates shown and submitted to a NYSDOH ELAP certified laboratory for VOC analyses per USEPA Method 8260C, for iron analyses per USEPA Method 6010C and for mercury analyses per USEPA Method 7470A.

(2) Refer to Figure 3 of this OM&M Report for schematic sample locations.

(3) Results validated following protocols specified in the Sampling and Analysis Plan (Appendix A) of the Groundwater OM&M Manual (ARCADIS 2009).

(4) "Total VOCs" represents the sum of individual concentrations of VOCs detected. Values shown have been rounded to the nearest whole number.

Acronyms\Key:

Bold value indicates a detection.

dup.	Duplicate.
ELAP	Environmental Laboratory Approval Program
J	Estimated value.
NYSDOH	New York State Department of Health
OM&M	Operation, maintenance and monitoring.
USEPA	United States Environmental Protection Agency.
VOC	Volatile organic compound.
µg/L	Micrograms per liter.
--	Not analyzed.
< 5 U	Compound not detected above its laboratory quantification limit.

ED_002631A_00010847-00070

ARCADIS Design & Consultancy for natural and built assets

COMPOUND (ug/L)	Sample ID Sample Location Sample Date	WSP-07 Effluent 9/28/2015
Volatile Organic Compounds		
1,1,1-Trichloroethane		< 1.0 U
1,1,2,2-Tetrachloroethane		< 1.0 U
1,1,2-Trichloroethane		< 1.0 U
1,1-Dichloroethane		< 1.0 U
1,1-Dichloroethene		< 1.0 U
1,2-Dichloroethane		< 1.0 U
1,2-Dichloropropane		< 1.0 U
2-Butanone		< 10 U
4-Methyl-2-Pentanone		< 5.0 U
Acetone		< 10 U
Benzene		< 0.5 U
Bromodichloromethane		< 1.0 U
Bromoform		< 1.0 U
Bromomethane		< 2.0 U
Carbon Disulfide		< 2.0 U
Carbon Tetrachloride		< 1.0 U
Chlorobenzene		< 1.0 U
Chlorodibromomethane		< 1.0 U
Chlorodifluoromethane (Freon 22)		< 5.0 U
Chloroethane		< 1.0 U
Chloroform		< 1.0 U
Chloromethane		< 1.0 U
cis-1,2-Dichloroethene		< 1.0 U
cis-1,3-Dichloropropene		< 1.0 U
Dichlorodifluoromethane (Freon 12)		< 2.0 U
Dichloromethane		< 2.0 U
Ethylbenzene		< 1.0 U
Methyl N-Butyl Ketone		< 1.0 U
Methyl-Tert-Butylether		< 1.0 U
Styrene (Monomer)		< 1.0 U
Tetrachloroethene		< 1.0 U
Toluene		< 1.0 U
trans-1,2-Dichloroethene		< 1.0 U
trans-1,3-Dichloropropene		< 1.0 U
Trichloroethene		< 1.0 U
Trichlorofluoromethane (Freon 11)		< 2.0 U
Trichlorotrifluoroethane (Freon 113)		< 1.0 U
Vinyl Chloride		< 1.0 U
Xylene-o		< 1.0 U
Xylenes - m,p		< 1.0 U
Tentatively Identified Compounds		0
Total VOCs [4]		0

See notes on last page.

ED_002631A_00010847-00071

ARCADIS Design & Consultancy for natural and built assets

COMPOUND (µg/L)	Sample ID Sample Location Sample Date	WSP-07 Effluent 9/28/2015
Metals		
Cadmium (Dissolved)		--
Cadmium (Total)		--
Chromium (Dissolved)		--
Chromium (Total)		--
Iron (Dissolved)		**266**
Iron (Total)		**325**
Manganese (Dissolved)		--
Manganese (Total)		--
Mercury (Dissolved)		--
Mercury (Total)		--

Notes:

(1) Water samples collected by Arcadis on the dates shown and submitted to a NYSDOH ELAP certified laboratory for VOC analyses per USEPA Method 8260C, for iron analyses per USEPA Method 6010C and for mercury analyses per USEPA Method 7470A.

(2) Refer to Figure 3 of this OM&M Report for schematic sample locations.

(3) Results validated following protocols specified in the Sampling and Analysis Plan (Appendix A) of the Groundwater OM&M Manual (ARCADIS

(4) "Total VOCs" represents the sum of individual concentrations of VOCs detected. Values shown have been rounded to the nearest whole number.

Acronyms\Key:

Bold value indicates a detection.

ELAP	Environmental Laboratory Approval Program
NYSDOH	New York State Department of Health
OM&M	Operation, maintenance and monitoring.
USEPA	United States Environmental Protection Agency.
VOC	Volatile organic compound.
µg/L	Micrograms per liter.
--	Not analyzed.
< 5 U	Compound not detected above its laboratory quantification limit.

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APPENDIX C

Vapor Sample Analytical Results

ARCADIS Design & Consultancy for natural and built assets

COMPOUND (ug/m³) / Location ID / Sample Location / Sample Date	VSP-1 Influent 8/19/2015	VSP-5 Effluent 8/19/2015
Volatile Organic Compounds		
1,1,1-Trichloroethane	**0.82**	< 0.55 U
1,1,2,2-Tetrachloroethane	< 0.69 U	< 0.69 U
1,1,2-Trichloroethane	< 0.55 U	< 0.55 U
1,1-Dichloroethane	**4.5**	< 0.81 U
1,1-Dichloroethene	**1.4**	< 0.79 U
1,2-Dichloroethane	< 0.81 U	< 0.81 U
1,2-Dichloropropane	< 0.92 U	< 0.92 U
1,3-Butadiene	< 0.44 U	< 0.44 U
1-Chloro-1,1-difluoroethane	< 0.82 U	< 0.82 U
2-Butanone	**1.0**	**44**
4-Methyl-2-Pentanone	< 0.82 U	< 0.82 U
Acetone	**17**	**337**
Benzene	**4.8**	**37**
Bromodichloromethane	< 0.67 U	< 0.67 U
Bromoform	< 0.41 U	< 0.41 U
Bromomethane	< 0.78 U	< 0.78 U
Carbon Disulfide	< 0.62 U	< 0.62 U
Carbon Tetrachloride	< 0.25 U	< 0.25 U
Chlorobenzene	< 0.92 U	**0.46 J**
Chlorodibromomethane	< 0.85 U	< 0.85 U
Chlorodifluoromethane (Freon 22)	**69**	**69**
Chloroethane	< 0.53 U	**0.82**
Chloroform	**54**	**7.8**
Chloromethane	**2.7**	**20**
cis-1,2-Dichloroethene	**147**	**3.3**
cis-1,3-Dichloropropene	< 0.91 U	< 0.91 U
Dichlorodifluoromethane (Freon 12)	**2.7**	**3.0**
Dichloromethane	**0.69**	**1.1**
Ethylbenzene	**7.8**	**0.83 J**
Methyl N-Butyl Ketone	< 0.82 U	**0.70 J**
Methyl tert-Butyl Ether	**0.72**	< 0.72 U
Styrene	< 0.85 U	< 0.85 U
Tetrachloroethene	**3.6**	**0.40**
Toluene	**49**	**7.5**
trans-1,2-Dichloroethene	**0.40 J**	< 0.79 U
trans-1,3-Dichloropropene	< 0.91 U	< 0.91 U
Trichloroethene	**59**	**1.8**
Trichlorofluoromethane (Freon 11)	**1.6**	**2.0**
Trichlorotrifluoroethane (Freon 113)	**2.5**	< 0.77 U
Vinyl Chloride	**125 D**	**14**
Xylene - o	**4.0**	**1.9**
Xylenes - m,p	**6.1**	**2.4**
Total VOCs	**564**	**555**

See notes on last page.

COMPOUND ($\mu g/m^3$) / Location ID / Sample Location / Sample Date	VSP-1 Influent 8/19/2015	VSP-5 Effluent 8/19/2015
Tentatively Identified Compounds		
alkane	--	9.5 JN
alkane	--	8.8 JN
alkane	--	8.1 JN
alkane	--	5.4 JN
Naphthalene decahydro-methyl	--	8.0 JN
Unknown	--	90 JN
Unknown	--	6.2 JN
UNKNOWN VOA ALKENE1	--	5.9 JN

Notes:

(1) Vapor samples collected by Arcadis on the dates shown and submitted to a NYSDOH ELAP certified laboratory for VOC analyses per Modified USEPA Method TO-15.

(2) Refer to Figure 3 of this OM&M Report for schematic sample locations.

(3) Results validated following protocols specified in the Sampling and Analysis Plan

(4) "Total VOCs" represents the sum of individual concentrations of VOCs detected. Values shown have been rounded to the nearest whole number.

Acronyms\Key:

Bold value indicates a detection.

D	Concentration is based on a diluted sample analysis.
ELAP	Environmental Laboratory Approval Program.
J	Compound concentration is estimated.
JN	Compound tentatively identified, concentration is estimated.
OM&M	Operation, maintenance and monitoring.
NYSDEC	New York State Department of Environmental Conservation.
NYSDOH	New York State Department of Health.
TIC	Tentatively identified compound.
USEPA	United States Environmental Protection Agency.
VOC	Volatile organic compound.
$\mu g/m^3$	Micrograms per cubic meter.
< 1.5 U	Compound not detected above its laboratory quantification limit.
< 1.5 UJ	Compound was not detected above its laboratory quantification limit. However, the limit is estimated.
--	TIC not detected.

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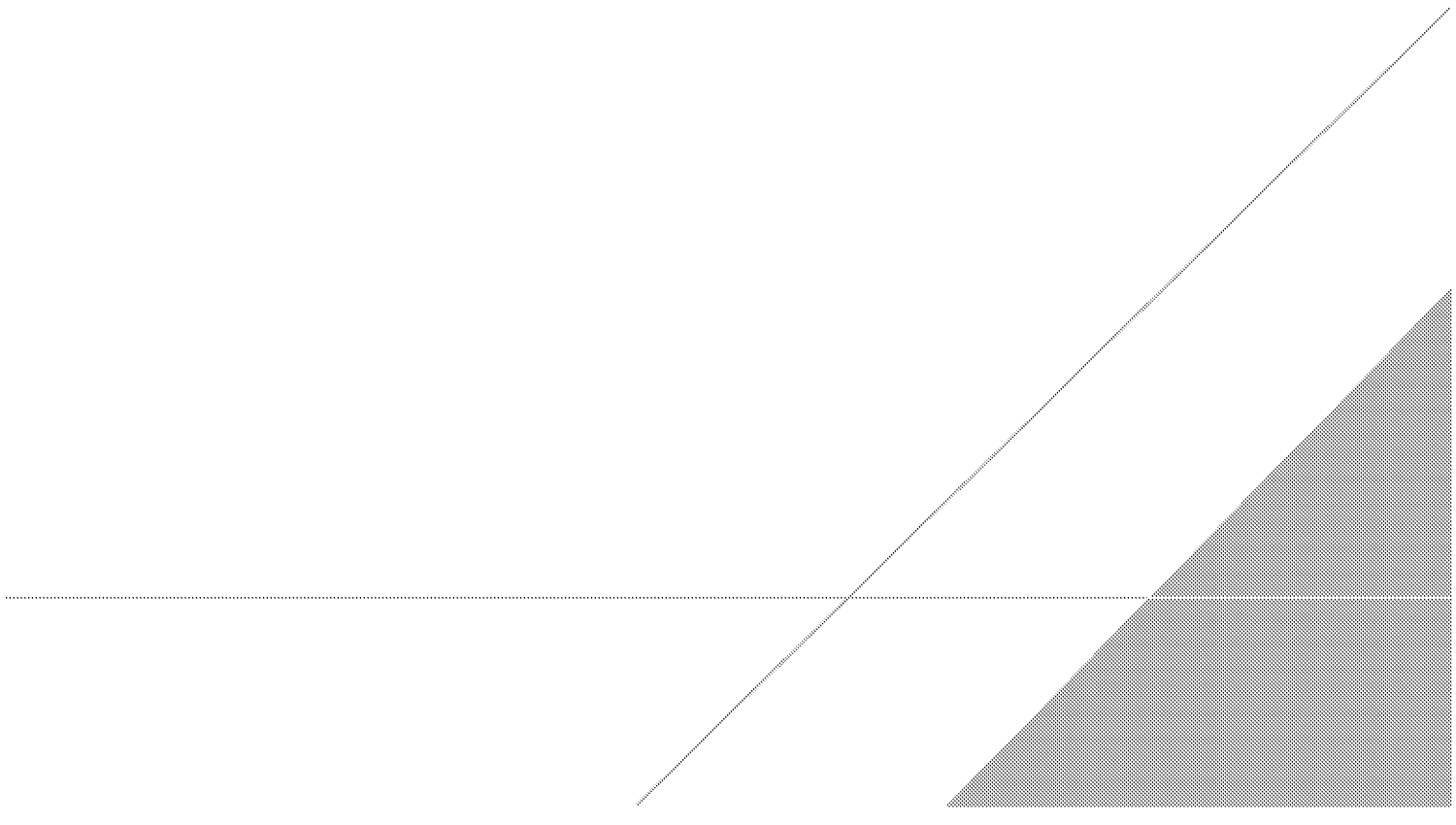
APPENDIX D

Air Discharge Quality Evaluation



Appendix D-1. Summary of SCREEN3 Model Input and Outputs, Bethpage Park Groundwater Containment System, Operable Unit 3 (Former Grumman Settling Ponds), Bethpage, New York.

ARCADIS Design & Consultancy for natural and built assets

Parameters	Date Sampled:	11/17/2014	2/12/2015	5/26/2015	8/19/2015
SCREEN3 Model Input					
Source Type		Point	Point	Point	Point
Emission Rate (g/s)		1	1	1	1
Stack Height (ft)		13.5	13.5	13.5	13.5
Stack Height (m)		4.1	4.1	4.1	4.1
Stack Inside Diameter (m)		0.36	0.36	0.36	0.36
Air Flow Rate (scfm)[1,9]		1,944	1,891	1,819	1,790
Air Flow Rate (acfm @ stack temp)[2,9]		1,943	1,882	1,859	1,836
Stack Gas Exit Temperature (K)[1,9]		294	293	301	302
Ambient Air Temperature (K)[3]		282	275	290	296
Receptor Height (m)[4]		1.5	1.5	1.5	1.5
Urban/Rural		Urban	Urban	Urban	Urban
Building Height (m)		2.6	2.6	2.6	2.6
Min Horizontal Bldg Dim (m)		7.9	7.9	7.9	7.9
Max Horizontal Bldg Dim (m)		9.8	9.8	9.8	9.8
Consider Bldg Downwash?		Yes	Yes	Yes	Yes
Simple/Complex Terrain Above Stack		Simple	Simple	Simple	Simple
Simple/Complex Terrain Above Stack Base		Simple	Simple	Simple	Simple
Meteorology		Full	Full	Full	Full
Automated Distances Array		Yes	Yes	Yes	Yes
Terrain Height Above Stack Base		0	0	0	0
SCREEN3 Model Output					
1-HR Max Concentration at Receptor Height ($\mu g/m^3$) [5]		2,100	2,190	2,211	2,208
Annualization Factor[6]		0.08	0.08	0.08	0.08
Average Annual Concentration at Receptor Height ($\mu g/m^3$)[7]		168	175	177	177
Distance To Max Concentration (m)[8]		8	8	8	8

See notes on last page.

Notes:

(1) The stack air flow rate (in scfm) and temperature were measured using inline instrumentation. Values were measured at the blower effluent location.

(2) The stack air flow rate at the stack temperature (in acfm) was calculated by dividing the stack air flow rate in scfm by the ratio of the standard temperature to the actual stack gas exit temperature in degrees Rankine.

(3) The ambient temperature was recorded from the weather.newsday.com and/or weather underground (www.wunderground.com) websites for Islip, New York. The mean actual temperature from the website(s) was used in model calculation.

(4) The receptor height corresponds to the average inhalation level.

(5) SCREEN3 calculated constituent concentration at listed conditions at the specified inhalation level.

(6) A USEPA time averaging conversion factor of 1/0.08 was used to convert the 1-hour maximum concentration output to an annual average.

(7) Average annual constituent concentration at the receptor height was calculated by multiplying the one hour maximum concentration by the annualization factor.

(8) SCREEN3 calculated distance to the 1-hour maximum concentration.

(9) This data was not recorded for the 8/19/2015 event. Data from 8/24/2015 was used instead.

Acronyms\Key:

$\mu g/m^3$	Micrograms per cubic meter.
acfm	Actual cubic feet per minute.
ft	Feet.
g/s	Grams per second.
K	Kelvin.
m	Meters.
scfm	Standard cubic feet per minute.
USEPA	United States Environmental Protection Agency.

Appendix D-2. Summary of Maximum Allowable Stack Concentration Calculations, Bethpage Park Groundwater Containment System, Operable Unit 3 (Former Grumman Settling Ponds), Bethpage, New York.

ARCADIS Design & Consultancy for natural and built assets

Compound	Actual Effluent Concentrations[1] (µg/m³)			
	11/17/2014	2/12/2015	5/26/2015	8/19/2015
1,1,1 - Trichloroethane	0	0	0	0
1,1 - Dichloroethane	8.5	5.3	0	0
1,2 - Dichloroethane	0	0	0	0
1,1 - Dichloroethene	1.2	1.3	0	0
2-Butanone	0	16	11	44
Acetone	6.9	206	129	337
Chloroform	33	26	8.3	7.8
Ethylbenzene	0.78	0.78	0	0.83
Xylene - o	0.61	0.61	2.2	1.9
Xylenes - m,p	0.96	0.91	4.3	2.4
Chloromethane	1.3	6.6	2.9	20
Chloroethane	0	0	0	0.82
Methylene Chloride	2.2	0.83	0	1.1
Tetrachloroethene	10	0.81	3.7	0.40
Trichloroethene	2.6	4.4	2.7	1.8
Vinyl Chloride	42	97.9	0	14
cis 1,2-Dichloroethene	144	234	0	3.3
trans 1,2-Dichloroethene	0	0	0	0
Benzene	0	5.1	4.5	36.7
Chlorobenzene	0	0	0	0.46
Toluene	19	11	20	7.5
2-Hexanone	0	0	0	0.70
Trichlorofluoromethane (Freon 11)	0	1.5	0	2.0
Dichlorodifluoromethane (Freon 12)	3.0	2.6	2.9	3.0
Chlorodifluoromethane (Freon 22)	122	103	91.1	68.9
Trichlorotrifluoroethane (Freon 113)	2.5	2.5	0	0

See notes on last page.

Appendix D-2. Summary of Maximum Allowable Stack Concentration Calculations,
Bethpage Park Groundwater Containment System, Operable Unit 3

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Compound	AGC[2] (µg/m³)	MASC[3] (µg/m³) 11/17/2014	2/12/2015	5/26/2015	8/19/2015
1,1,1 - Trichloroethane	5,000	3.25E+07	3.21E+07	3.21E+07	3.27E+07
1,1 - Dichloroethane	0.63	4.09E+03	4.05E+03	4.05E+03	4.12E+03
1,2 - Dichloroethane	0.038	2.47E+02	2.44E+02	2.44E+02	2.48E+02
1,1 - Dichloroethene	200	1.30E+06	1.29E+06	1.29E+06	1.31E+06
2-Butanone	5,000	3.25E+07	3.21E+07	3.21E+07	3.27E+07
Acetone	30,000	1.95E+08	1.93E+08	1.93E+08	1.96E+08
Chloroform	14.7	9.54E+04	9.45E+04	9.45E+04	9.61E+04
Ethylbenzene	1,000	6.49E+06	6.43E+06	6.43E+06	6.53E+06
Xylene - o	100	6.49E+05	6.43E+05	6.43E+05	6.53E+05
Xylenes - m,p	100	6.49E+05	6.43E+05	6.43E+05	6.53E+05
Chloromethane	90	5.84E+05	5.78E+05	5.78E+05	5.88E+05
Chloroethane	10,000	6.49E+07	6.43E+07	6.43E+07	6.53E+07
Methylene Chloride	60	3.89E+05	3.86E+05	3.86E+05	3.92E+05
Tetrachloroethene	4	2.60E+04	2.57E+04	2.57E+04	2.61E+04
Trichloroethene	0.2	1.30E+03	1.29E+03	1.29E+03	1.31E+03
Vinyl Chloride	0.068	4.41E+02	4.37E+02	4.37E+02	4.44E+02
cis 1,2 Dichloroethene	63	4.09E+05	4.05E+05	4.05E+05	4.12E+05
trans 1,2 Dichloroethene	63	4.09E+05	4.05E+05	4.05E+05	4.12E+05
Benzene	0.13	8.44E+02	8.35E+02	8.35E+02	8.50E+02
Chlorobenzene	60	3.89E+05	3.86E+05	3.86E+05	3.92E+05
Toluene	5,000	3.25E+07	3.21E+07	3.21E+07	3.27E+07
2-Hexanone	30	1.95E+05	1.93E+05	1.93E+05	1.96E+05
Trichlorofluoromethane (Freon 11)	5,000	3.25E+07	3.21E+07	3.21E+07	3.27E+07
Dichlorodifluoromethane (Freon 12)	12,000	7.79E+07	7.71E+07	7.71E+07	7.84E+07
Chlorodifluoromethane (Freon 22)	50,000	3.25E+08	3.21E+08	3.21E+08	3.27E+08
Trichlorotrifluoroethane (Freon 113)	180,000	1.17E+09	1.16E+09	1.16E+09	1.18E+09

See notes on last page.

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Compound	Percent of MASC[4]			
	11/17/2014	2/12/2015	5/26/2015	8/19/2015
1,1,1 - Trichloroethane	0.00%	0.00%	0.00%	0.00%
1,1 - Dichloroethane	0.21%	0.13%	0.00%	0.00%
1,2 - Dichloroethane	0.00%	0.00%	0.00%	0.00%
1,1 - Dichloroethene	0.00%	0.00%	0.00%	0.00%
2-Butanone	0.00%	0.00%	0.00%	0.00%
Acetone	0.00%	0.00%	0.00%	0.00%
Chloroform	0.03%	0.03%	0.01%	0.01%
Ethylbenzene	0.00%	0.00%	0.00%	0.00%
Xylene - o	0.00%	0.00%	0.00%	0.00%
Xylenes - m,p	0.00%	0.00%	0.00%	0.00%
Chloromethane	0.00%	0.00%	0.00%	0.00%
Chloroethane	0.00%	0.00%	0.00%	0.00%
Methylene Chloride	0.00%	0.00%	0.00%	0.00%
Tetrachloroethene	0.04%	0.00%	0.01%	0.00%
Trichloroethene	0.20%	0.34%	0.21%	0.14%
Vinyl Chloride	9.45%	22.40%	0.00%	3.15%
cis 1,2 Dichloroethene	0.04%	0.06%	0.00%	0.00%
trans 1,2 Dichloroethene	0.00%	0.00%	0.00%	0.00%
Benzene	0.00%	0.61%	0.54%	4.32%
Chlorobenzene	0.00%	0.00%	0.00%	0.00%
Toluene	0.00%	0.00%	0.00%	0.00%
2-Hexanone	0.00%	0.00%	0.00%	0.00%
Trichlorofluoromethane (Freon 11)	0.00%	0.00%	0.00%	0.00%
Dichlorodifluoromethane (Freon 12)	0.00%	0.00%	0.00%	0.00%
Chlorodifluoromethane (Freon 22)	0.00%	0.00%	0.00%	0.00%
Trichlorotrifluoroethane (Freon 113)	0.00%	0.00%	0.00%	0.00%

Notes/Acronyms:

(1) Actual effluent concentrations are analytical results from air samples collected on the dates shown.

(2) Compound-specific AGC values per the NYSDEC DAR-1 AGC/SGC tables, revised February 28, 2014.

(3) Maximum allowable stack concentrations were calculated by dividing the product of the annual guideline concentration of a compound and the ratio of the SCREEN3 gas emission rate and the SCREEN3 average concentration at receptor height by the air flow rate at the stack temperature and multiplying by the appropriate conversion factors.

(4) Percent of MASC was calculated by dividing the actual effluent concentration by the MASC for a given monitoring event.

$\mu g/m^3$ Micrograms per cubic meter

AGC Annual guideline concentration

MASC Maximum allowable stack concentration

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ARCADIS Design & Consultancy for natural and built assets

Arcadis of New York, Inc.

Two Huntington Quadrangle

Suite 1S10

Melville, New York 11747

Tel 631 249 7600

Fax 631 249 7610

www.arcadis.com